

EXAMINATION OF THE HORTICULTURAL INDUSTRY 1970

Corrigenda

- Page 6; Table 1: *Delete words "peas harvested dry and green peas for processing"*
- Table 2: *Delete "†" against "Vegetables" and ‡ against "Mushrooms"; insert "†" against "All crops under glass".*
- Page 20; fifth line: *Delete "stabilising"; insert "stabilizing".*
- Page 34; second line: *Delete final "s" from "installations".*
- Page 70; Table 32: *tenth column: insert "to" between "1000" and "1,999.9"; eleventh column: delete "to" after "2,000".*
- Page 112; Appendix VIII: last column headed "Estimated cost of proposals": *delete "60,158,192"; insert "68,158,192."*

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PART I

General Review

1. The present examination of developments within the horticultural industry in the United Kingdom which the Agricultural Departments have undertaken, in close consultation with the Farmers' Unions, is the third in the series. The records of the two previous examinations, which were held in 1965 and 1967, together contain a comprehensive account of the principal features of and developments in the horticultural industry up to that time. A further examination must necessarily cover much of the same ground in order to ensure, as far as possible, that no new developments which are likely to prove of major significance have been overlooked. It is, however, hardly surprising that there is little evidence of major change in the structure of the industry in the short time that has elapsed since the last examination, and where there is little or no significant change to report the present record does not attempt to repeat the findings of its predecessors. The current examination has taken place at a time when negotiations for British entry to the European Economic Community have been going on. Although it is apparent that entry to the Community would have considerable effects on the horticultural industry, it would not be appropriate in this essentially factual record to attempt to forecast future developments in the industry.

2. Although there is little major structural change to record, certain changes of emphasis are to be discerned in the interests and outlook of leading growers. For the purpose of the examination, six specialist groups were set up to consider the main sectors of the horticultural industry, with particular reference to certain selected crops. The records of these studies, which are reproduced in full below, show clearly the major part which questions of distribution and marketing have played in the deliberations of all the six groups. The industry has recently passed through an era when increases in yield have resulted from advances in plant breeding, and in disease, pest and weed control, increased mechanization and, in the case of glasshouse crops, greater control of the environment. This has led to increased supplies from established growers and the extension of production by others who find many horticultural crops provide useful alternatives for their traditional farming and, at the same time, seek to increase their income by such crops as can be easily mechanized. The industry is in consequence becoming increasingly aware of the need for the grower to plan his production with conscious reference to the requirements of the market. This state of affairs is not of course wholly new. Adjustment to external forces is a continuing process, and horticulture has never believed itself to be a static or isolated sector of the economy. The changes over the last fifteen or twenty years in the distribution system, in consumers' tastes and habits, in methods of processing and presentation and in the relative costs of the basic factors of production have, however, been of quite unwonted complexity and speed, and since the date of the last examination there have been substantial increases in the cost of such major items of expenditure as transport, wages, fuel oil and packaging. These changes, combined with the increasing scale of production, mean that marketing and managerial responsibilities are playing an ever increasing role in the producer's life. For the large-scale producer, these already familiar aspects are

assuming a new urgency. The small intensive producer, like his counterpart in industry and commerce, is finding that the continuance of his business may depend on his giving them a greater priority.

3. Advances in production techniques have led over the years to two quite different horticultural developments. On the one hand, there has been a movement towards very closely controlled production, demanding sophisticated equipment and a high degree of specialization in its practitioners, and rewarding them with more uniform and predictable results than were previously considered possible in horticultural production. The production of AYR chrysanthemums is an outstanding example of this type of production. On the other hand, chemical methods of pest, disease and weed control and the extension of mechanical cultivations in the field have encouraged the movement of many vegetable crops away from specialist horticultural holdings towards production on larger arable farms, since many of these techniques can be applied without any great degree of individual expertise in the needs of particular crops. There is clearly room for yet further advances in the techniques of production—for instance, in the development of disease and pest resistant strains of plant, in exploring ways of making sensitive fruit crops more resistant to frost damage and of improving pollination, in further investigation of the effects of light and temperature control in glasshouse production, and in the biological control of pests—and growers are particularly interested also in seeing that research is directed along the lines dictated by market requirements: for instance, the breeding of crop varieties to fill particular gaps in market supply, either by extending the season of particular fruits or vegetables or by producing a type of plant, such as a crisp winter lettuce, which is not at present available from home sources. The greatly increased cost of labour, and the possibility of future increases arising from the introduction of equal pay for men and women workers when the Equal Pay Act 1970 becomes fully operative at the end of 1975, have led growers to attach much importance to the development of mechanical harvesting. For many crops this depends on the breeding of strains whose maturing dates would not be spread over a long time span, and which could therefore be harvested in a single operation instead of demanding several successive pickings by hand. The speedier evolution of satisfactory types of mechanical harvester can be facilitated also by co-operation between the many persons and organizations interested in developing machines for harvesting different crops.

4. The bulk of our supplies of horticultural produce is still handled through the wholesale markets, which have an important balancing function in the national distributive system to perform: the importance of improved facilities at these markets has not diminished. Further progress is now being made with the redevelopment of major wholesale horticultural markets for which grants are payable under the Agriculture and Horticulture Act 1964. New markets were opened in 1968 and 1969 at Bristol, Gateshead, Glasgow, Leicester and Liverpool. In 1971 the new Edinburgh market is already well advanced and construction of the new Covent Garden market at Nine Elms and the new market at Manchester is about to begin. Notwithstanding the essential functions of the wholesale markets in the national distribution system there are other possible ways for growers to dispose of

their crops. The current examination has focused its attention on the additional opportunities there are for growers to engage in direct selling—whether to end-buyers, manufacturers or large retail chains. Such methods are at first sight attractive in apparently cutting distribution costs but, as the following paragraphs show, there are disadvantages as well as advantages in each method, and it becomes increasingly important for each grower to consider which method or methods would be best in his own particular circumstances.

5. The simplest form of direct selling is the farm gate sale, whether from a stall or on a pick-it-yourself basis. The garden centre is a more sophisticated development in the same general direction; but here the equipment and lay-out are more elaborate, the investment in the selling side of the enterprise greater and its demands on the grower's time—if he runs the centre himself—heavier. All these methods have the advantage of bringing the producer into a more direct relationship with the final consumer, and giving him an opportunity to learn at first hand what the consumer likes and is willing to pay for and—what is often more difficult to discover—what he would be willing to buy if only someone would sell it to him. This shortening of the lines of communication between producer and consumer can be of very considerable benefit to some members of an industry which places comparatively little reliance on advertising as a means of creating demand; and all the more so where produce is of comparatively slow growth, as with much hardy nursery stock and fruit stock, so that it is difficult for the grower to react quickly to changes in demand. The disadvantage of direct sale is that the market is limited to passers-by and those within easy driving distance, and often depends on the weather or on holiday or weekend traffic. Particularly for the garden centre, there is also the likelihood that if the enterprise grows beyond a very modest scale the producer may find himself with something approaching a full time job of selling as well as of growing.

6. An alternative method of direct selling is often by a co-operative to a large buyer. The buyer may be a processor or a retailer or chain of retail stores; but, apart from the small or medium-sized retailer, he is likely to market the produce on a considerable scale. This arrangement has the advantage of allowing the grower to concentrate the major part of his energies on the growing of the crop while benefiting from the consumer-awareness and selling expertise of these buyers, many of whom either conduct their own consumer research or employ market consultants. It also lends itself to the growing of produce under contract, which reduces the risks associated with chance marketing and tends to stabilize prices. Direct selling of this kind, whether under contract or not, does put all but the largest growers or groups of growers in a relatively weak bargaining position and the need for a steady supply of produce, complying with uniform standards, imposes its own special demands on the grower and requires careful consideration of the economics of the enterprise. It is in fact extremely difficult for small growers to supply the largest of the multiple retailing groups, since these are only interested in regular supplies of uniform produce in sufficient bulk to justify the use of their large scale transport and mechanical handling arrangements. Such groups will only deal with the very largest growers or those

who send their produce through large scale co-operative or commercial marketing organizations.

7. One of the problems to consider is how to dispose of produce which fails to reach the rigid specifications demanded by the processor, particularly for freezing, and by the most selective of the multiple stores. On one view, a grower whose produce falls only slightly below the specification can expect a good fall-back price from the wholesale market, while on the other view there is danger that the market will become glutted, with disastrous effects on prices, as a result of deliveries of produce which is not acceptable for processing and must speedily be sold before it rots. Modern methods of precision growing, however, give the producer greater confidence that a high proportion of his crop will be up to the required specification. Certainly processing has extended the outlets for produce beyond the natural season and the capacity of local markets, and in general the demand for convenience foods, especially quick frozen foods, continues to grow. Nevertheless, tastes change and particular items may lose their popularity; and sometimes increased popularity may encourage imports, for the grower no longer obtains the advantage of nearness to the consumer. The mushroom industry, which is particularly conscious of the value of the natural protection which the grower of highly perishable produce may enjoy in his home market, has deliberately concentrated on the marketing of fresh mushrooms rather than on promoting sales of processed mushrooms.

8. The supermarket, with its rapidly growing command of a sizeable section of the retail market, has attracted much attention as a potentially valuable outlet for horticultural produce, although there are some indications that in the United States it has proved less useful in this respect than might have been hoped for. Floor and shelf space are at a premium in this type of store, and there is obviously limited scope for the bulkier and lower-priced type of produce. Even for those fruit and vegetable crops whose value is high in relation to their bulk, supermarket retailing presents serious difficulties in the short shelf-life of their product and the technical problems of producing a pre-pack whose contents will neither become desiccated nor give off enough moisture to cloud an otherwise neat and attractive polythene wrapping. For goods which lend themselves to this type of distribution, or which can be made to conform to its demands, distribution through supermarkets and other non-specialist stores does offer a new opportunity for luxury and near-luxury produce to attract impulse buyers, since the concentration of buyers makes it economic for a supermarket to run exotic lines. The flower growing section of the industry has drawn particular attention to the importance of impulse buying, and to the desirability of increasing also the number of casual outlets, such as kiosks and street stalls, as well as shops and supermarkets.

9. Apart from farm gate and garden centre sales, where the consumer provides his own transport, all types of distribution, including distribution through the traditional wholesale market, are faced with formidable and increasing difficulties of transport. The present localization of production areas for different types of crop has been greatly influenced by the rail network of the last 70 to 100 years, and has adapted itself to meet the distribution system which that implied. Many growers are understandably reluctant

to accept the implications of the disappearance of much of the rail transport system as it existed until only a few years ago. Others have recognized that future transport will be increasingly by road, and this realization is sharpening interest in the use of insulated or refrigerated transport and in the prior use of cooling and conditioning rooms for harvested crops. For many vegetable and other crops developments of this kind still pose technical problems, such as the maintenance of an adequate degree of humidity, as well as adding to costs ; but growers are increasingly looking to cold storage, both at the farm and in transit, to meet the serious difficulties of short-term gluts as well as the new difficulties of transport. The increased use of road transport, whether in insulated containers or not, also underlines the need for the grower himself to take the initiative in arranging for the despatch of produce in large enough quantities to make an economic consignment. This may mean several producers combining to share their transport ; and if the more distant markets for certain types of produce grown in rather limited localities—e.g., watercress, asparagus—are to be retained, specialist producers of such crops may find it necessary to seek means of co-operating with growers of other crops in the joint use of road transport.

AREA AND OUTPUT OF HORTICULTURAL CROPS

10. The changes in recent years in the areas under production in each of the main horticultural sectors, and the value of their output, are summarized in Tables 1 and 2 ; and more detailed figures are given in Appendices I to IV.

The downward trend in the area under fruit has slowed down in the three years since the last Examination. The biggest proportionate declines have been in the acreages devoted to cherries, plums, blackcurrants and gooseberries, whereas the acreages under dessert apples and pears and strawberries have remained fairly constant since 1966/67, and the raspberry acreage has increased. There has been a marked rise in the acreage of outdoor vegetables during the same period, the increase being particularly marked for peas (both green peas and those harvested dry), runner and French beans, carrots, dry bulb onions and brussels sprouts. There has also been some expansion in the smaller acreages devoted to the production of bulbs and flowers in the open, hardy nursery stock and glasshouse crops, particularly lettuce.

12. For all horticultural crops, particularly those in the open, prices are affected not only by acreage variations and by fluctuations in yield and quality induced by changes in weather conditions over the years, but also by shifts in demand. It would be wrong, therefore, to attach over-much significance to a comparison of the current priced output values for any two particular years. Nevertheless, the total farm gate value of horticultural output at current prices, as defined in Table 2, will be seen to have increased by nearly a quarter between 1966/67 and 1969/70. However, whereas the rise in the value of outdoor vegetable crops over these three years is part of a relatively steady improvement deriving chiefly from an expansion in acreage, the increase in the value of outdoor fruit over the same period was due largely to the fact that orchard fruit production in 1966/67 was low. Likewise, the marked increase in the value of hardy nursery stock chiefly reflects an increased acreage, while the increases in the values of crops under glass, and flowers and bulbs in the open, result largely from improved yields and higher prices.

TABLE 1
Cropped Areas

	Yearly average, acres			
	1956/57 to 1960/61	1960/61 to 1964/65	1964/65 to 1968/69	1969/70 (Pro- visional)
Vegetables in the open, U.K.* (excluding potatoes, peas harvested dry and green peas for processing)	466,067	437,132	433,441	509,802
Orchard and soft fruit*	287,814	256,294	223,888†	214,045†
Fruit, flowers and vegetables under glass and in frames and sheds, England and Wales only*	6,755	6,851	7,386	7,946
Bulbs and flowers in the open, England and Wales only‡	16,975	18,527	18,763	18,979
Hardy nursery stock, England and Wales only‡	12,994	13,731	14,278	15,626

* Based on one or more censuses with allowances for double cropping, failures, etc.

† Subject to adjustment in the light of the results of the 1970 Orchard Fruit Census.

‡ Census data.

TABLE 2
Value of United Kingdom output at farm gate

	1964/65	1966/67	1969/70 (Provisional)
	£m.	£m.	£m.
Vegetables in the open*	70.2	77.1	94.6
Fruit in the open	47.0	38.4†	46.9†
All crops under glass:			
(i) Vegetables†	17.9	18.0	23.8
(ii) Mushrooms‡	7.9	8.4	10.7
(iii) Fruit	0.1	0.1	0.1
(iv) Flowers	17.5	19.3	21.4
Hardy nursery stock	43.4	45.8	56.0
Flowers and bulbs in the open	14.4	15.8	20.5
	6.1	6.5	8.0
Total	181.1	183.6	226.0

* Excluding potatoes.

† Subject to adjustment in the light of the results of the 1970 Orchard Fruit Census.

‡ Including production from frames etc.

PART II

RECORD OF STUDIES BY SPECIALIST GROUPS

The records of special studies which follow represent the work of specialist groups consisting of representatives of the agricultural departments and of growers in the particular sectors of the industry concerned.

Record of Study by the Fruit Group

1. In 1969/70, U.K. fruit production was valued at the farm gate at £47 million, a little over one-fifth of the value of all horticultural production. Of this total, top fruit was worth £29 million and soft fruit £18 million. We have made a special study of apples, pears, early strawberries grown under protection, raspberries, blackcurrants and gooseberries. These crops, together with maincrop strawberries currently account for 85 per cent of the total cropped area and 90 per cent of the total value of fruit in the U.K. The first four of these crops were studied in some detail in the course of the last examination, three years ago. We were not surprised to find that there have been no fundamental changes in their production during this short period, and we have seen no merit in repeating statistical and other information that was included in the 1967 Report. We have, therefore, concentrated our attention very largely on marketing prospects, and on drawing attention to those aspects of production where research and development seem most deserving of effort.

2. One qualification must be made. The structural surpluses of apples and pears within the European Economic Community makes the prospect of joining the Community a matter of paramount concern to top fruit growers. Our task, however, has been to examine the present structure of the industry and we have not attempted to make any assessment of how the situation might change if the U.K. became a member of the E.E.C. To do so would not only be beyond our terms of reference, but would duplicate the special studies which are being made, both by growers and by the Agricultural Departments, of the effect which membership of an enlarged Community might be expected to have on each section of the horticultural industry.

ORCHARD FRUIT

3. The total cropped area under orchard fruit in the U.K. in 1969/70 was estimated at some 170,000 acres. This was made up of 59,000 acres of dessert apples and 40,000 acres of cooking apples, 23,000 acres of cider apples, 18,000 acres of pears (including perry pears), 19,000 acres of plums, 8,000 acres of cherries and 3,000 acres of mixed or other fruit. Acreages of some fruits have increased but overall the area has declined by 2 per cent during the three years since the last examination, cherries and plums suffering the biggest proportionate losses (15 per cent and 6 per cent respectively). Neither of the two crops selected for particular study, apples and pears, are grown

to more than a very limited extent in Scotland, and only cooking apples are grown on any appreciable scale—nearly 7,000 acres—in Northern Ireland. The last four-yearly Orchard Census was carried out in 1966, and the results of the 1970 Orchard Census were not available to us ; so it was not possible to bring up to date the last Examination's statistical analysis of the age and varieties of the orchard plantings ; but there can be no doubt that there are still many acres of old and unproductive orchards, particularly of apples and pears. The figures available from the yearly June census give a good deal of information, however, on the sizes of orchards, and it is perhaps noteworthy that just over half the commercial orchard holdings in England and Wales at June 1969 grew less than 5 acres of orchard fruit, although 70 per cent of the total commercial acreage was to be found on holdings with over 30 acres, and over a third on holdings with 100 or more acres, of orchard fruit.

APPLES AND PEARS

4. The estimated cropped area of *dessert apples* in the U.K. in 1969/70 was 58,640 acres, just 1,000 more than in 1966/67. The output in 1969/70, after two low crop years in succession, reached 261,000 tons. This was a higher figure than at almost any other time in the last 20 years, although it still did not reach the potential maximum. Top fruit yields are, however, very much at the mercy of the weather at pollination time, and over the last three years the average yield for dessert apples has been as low as 74 cwt, and as high as 107 cwt, per acre of the total bearing area, giving an average output of 213,000 tons per annum.

5. The U.K. acreage of *cooking apples* fell from 42,163 acres to 40,358 acres between 1966/67 and 1969/70. Of the total 1969/70 acreage, 33,700 acres were in England and Wales and 6,650 acres in Northern Ireland, with an output of 117,000 tons and 27,000 tons respectively. Cooking apples are even more subject to fluctuation in yield than are dessert apples, largely because of the marked susceptibility of the widely-planted Bramley to frost damage at a quite early stage of blossom development, before the flowers actually open.

6. The U.K. acreage of *cider-apples*—which means the England and Wales acreage—has been fairly steady at around 23,000 acres over the last three or four years. As with other top fruit, the output varies very widely according to weather conditions, and it would be rash to speculate on whether any longer-term significance can be attached to the fact that, with a fairly stable acreage, the output has risen from an estimated 23,000 tons in 1966/67 to well over 30,000 tons in 1968/69. The estimated value of the cider apple output in 1969/70 was about £½ million compared with £15 million for dessert apples and over £6 million for cooking apples.

7. In 1969/70 there were 17,750 acres of *pears* in the U.K., including 2,330 acres of perry pears. The acreage has not changed appreciably during the last three years. Output in 1969/70 amounted to 58,200 tons of eating and 3,100 tons of perry pears, valued at around £3 million and £40,000 respectively.

Production of cooking apples in Northern Ireland

8. The processing of Bramleys is the backbone of the Northern Ireland horticultural processing industry, and as about 80 per cent of the orchards

producing Bramleys will be nearing the end of their economic life within the next 15-20 years, an Orchard Planting Grant Scheme has been introduced to enable growers to start a replanting programme so that new orchards will be in the fruit bearing stage when the old orchards go out of production. The scheme started in November 1967, since when nearly 800 acres have been planted or approved for planting. During the same period the Experimental Centre at Loughall, Co. Armagh, has propagated trees for the production of Bramleys which are free from all known virus diseases. In November 1967 the first complete orchard of these trees was planted—the first time that such trees had been planted on a commercial scale anywhere in the world. By the end of 1968 6,000 of the trees had been sold to growers, and production is being increased to a total of 20,000. The Ministry of Agriculture for Northern Ireland will be propagating these trees on a commercial basis until 1972, and all trees which will be available up to that date have already been booked by growers.

Research and development

9. Considerable effort is being expended by research and experimental stations, individual growers and others to find ways of ensuring regularity of cropping of top fruits. Methods to control frost and to improve pollination are of over-riding importance. In the planting of new orchards, selection of favourable growing sites, the choice of rootstocks, density of planting and the use of tree shapes to ensure production of best quality fruit are all of major importance to orchard economy.

10. The industry is still dependent on hand labour for picking the crop, although mechanical harvesting aids are increasingly used for transport from orchards to packhouse or store.

Consumption and demand

11. Consumption of apples in the U.K. is maintained at a fairly consistent level, allowing for the public's natural tendency to buy more apples in years of high yields and low prices. Publicity by the Apple and Pear Development Council has been a material factor in maintaining demand for the familiar apple against the 'luxury' fruits to which an increasingly affluent consuming public might otherwise tend to turn. Growers are increasingly finding that only the best and most popular varieties are worth growing on a commercial scale; but although most of the really old varieties have by now been eliminated from commercial orchards, there are still a number of varieties in production—e.g., George Cave, Laxton's Fortune and Lord Lambourne—which have fallen out of demand or proved otherwise unprofitable except in years of general crop shortage.

12. With pears in particular, which are woody and tasteless if eaten too soon but which quickly become over-ripe, there is scope for improvement in handling and conditioning at all stages, from production right through to the consumer. A number of packhouses now make use of conditioning rooms before despatching their fruit; and the industry would benefit from the education of both the distributive trade and their customers in the way in

which fruit should be kept and handled if it is to be eaten in prime condition. With both pears and apples, however, there is some danger of bringing about a decline in popularity as a result of attempts to catch the remunerative early market by selling immature fruit which is tasteless or sour; a variety which has once disappointed the purchaser in this way will tend to be left unsold thereafter, even though in the interval it may have ripened and become entirely palatable.

Outlets

13. The wholesale market is still the main outlet, and a very large number of growers continue to make their own individual arrangements with wholesalers. The high, and still rising, cost of distribution is however increasingly disposing growers to seek alternative or additional outlets. Direct sales have particularly benefited from the growth of producers' organizations with quantities of carefully graded fruit at their disposal, and this type of organization has the further advantage of being able to control the flow of its members' produce with due regard to the varying state of the market. There is a certain amount of direct sale of both cooking and dessert apples to schools, factory canteens and other institutions. The rapid development in recent years of direct grower-to-consumer sales at the farm gate or through roadside stalls has been exploited by a number of soft and top fruit growers. There may possibly be some scope also—transport costs permitting—for an extension of direct sale by post. 'Pick-it-yourself' sales, until recently, have been limited to soft fruits, but the heavy 1970 dessert apple crop has encouraged some top fruit growers to consider this method. These various alternative methods of distribution give an indication of the possible future pattern of marketing although, in the main, the pattern of distribution is changing slowly.

Packaging for retail sale

14. The tendency is towards increasingly elaborate packaging although recently there has been some evidence of a reaction against it. Even large growers have not for the most part felt that the premium which pre-packaged orchard fruit commands is sufficient to justify the high initial equipment and running costs involved in carrying out the operation on the farm, and pre-packaging is mostly carried out by fruit packhouses or specialist pre-packing firms.

Processing

15. The main processing outlets, apart from the specialized cider industry, are for pulp, apple juice and peeled, cored and prepared apples supplied ready for use by the catering industry or for pie fillings etc., and in Northern Ireland for the canning of solid pack apples. The further development of processing outlets would be welcome in order to ease the pressure of supply on the fresh market, particularly in years of heavy yields, although it is realized that processors need a steady supply, and that it is not economic for them to adjust their production to meet the grower's difficulties arising from fluctuating yields. Here again techniques to give more regular yields would be of assistance to the industry in developing these outlets.

TABLE 3
Dessert Apples
U.K. production and imports

Year	Home Grown (Agricultural Holdings only)						Net Imports*		Total Supplies by Weight
	Total area acres	Bearing area gross yield cwt./acre	Output '000 tons	Growers' farm gate price £/ton	Value £'000	Bearing area value per acre £	Total quantity '000 tons	Total value £'000	Home grown per cent
1956/57	64,900	88.5	201.6	70.19	14,150	283	182.6	13,921	52
1957/58	65,526	84.5	210.0	88.96	18,683	360	178.2	14,243	54
1958/59	65,146	102.2	237.3	50.72	12,045	224	178.3	17,169	57
1959/60	65,080	92.2	221.2	66.41	14,692	275	193.1	15,378	53
1960/61	65,230	112.6	253.6	47.35	12,006	221	183.5	16,265	58
1961/62	64,051	74.7	189.5	104.21	19,747	377	207.2	18,772	48
1962/63	63,037	95.4	245.1	65.10	15,955	294	229.8	22,985	52
1963/64	62,356	102.6	254.6	55.80	14,206	264	202.0	19,073	56
1964/65	61,380	117.9	283.0	53.05	15,013	281	225.6	21,939	56
1965/66	59,237	102.0	247.2	60.66	14,995	288	234.7	24,556	51
1966/67	57,637	84.6	202.5	70.36	14,248	284	248.8	26,762	45
1967/68	57,877	74.4	183.7	96.48	17,723	345	248.6	28,866	42
1968/69	58,732	78.4	194.8	91.49	17,823	346	265.5	32,164	42
1969/70	58,640	107.4	260.9	57.39	14,973	286	250.1	33,441	51

* Imports relate to the first calendar year indicated.

TABLE 4
Cooking Apples
U.K. production

Year	Home Grown (Agricultural Holdings only)					
	Total area acres	Bearing area gross yield cwt./acre	Output '000 tons	Growers' farm gate price £/ton	Value £'000	Bearing area value per acre £
1956/57	67,725	98.3	277.4	24.31	6,743	106
1957/58	65,412	70.9	211.6	43.44	9,193	149
1958/59	62,836	118.1	285.9	17.79	5,087	86
1959/60	60,194	104.8	256.4	23.20	5,949	105
1960/61	58,770	131.5	267.6	16.80	4,497	81
1961/62	54,602	44.0	108.8	70.29	7,648	149
1962/63	51,620	90.7	216.2	31.79	6,874	138
1963/64	49,563	96.8	210.8	33.06	6,969	147
1964/65	47,273	133.2	262.6	26.77	7,031	156
1965/66	44,978	104.2	206.7	30.75	6,355	150
1966/67	42,163	65.4	126.8	43.66	5,536	138
1967/68	41,378	57.5	109.1	60.99	6,654	168
1968/69	40,530	77.4	143.7	49.37	7,095	183
1969/70	40,358	79.1	144.2	44.05	6,352	156

Import statistics do not distinguish between dessert and cooking varieties. Imports are assumed to be almost exclusively dessert apples.

TABLE 5

Pears

U.K. production and imports

Year	Home Grown (Agricultural Holdings only)						Net Imports*		Total Supplies by Weight
	Total area acres	Bearing area gross yield cwt./acre	Output '000 tons	Growers' farm gate price £/ton	Value £'000	Bearing area value per acre £	Total quantity '000 tons	Total value £'000	
									Home grown per cent
1956/57	17,478	93.8	61.0	51.74	3,156	230	56.9	4,681	52
1957/58	17,518	61.9	42.0	112.24	4,713	339	53.1	4,722	44
1958/59	17,608	116.0	71.0	42.18	2,993	216	58.4	5,088	55
1959/60	17,745	93.1	61.4	61.58	3,781	267	58.4	4,962	51
1960/61	17,680	98.6	65.7	45.05	2,961	203	60.0	5,187	52
1961/62	16,920	72.8	50.1	87.92	4,401	307	63.7	6,061	44
1962/63	16,598	71.8	49.9	61.20	3,054	211	70.3	6,604	42
1963/64	16,438	87.5	59.3	48.43	2,872	201	54.1	4,938	52
1964/65	16,264	91.4	62.5	59.44	3,715	263	65.7	6,072	49
1965/66	15,668	94.7	60.5	53.12	3,214	243	50.7	5,483	54
1966/67	15,223	54.4	34.9	73.44	2,563	193	77.9	7,550	31
1967/68	15,200	34.6	22.4	80.45	1,802	134	64.6	7,100	26
1968/69	15,258	111.5	70.6	50.28	3,550	262	57.3	6,226	55
1969/70	15,417	88.9	58.2	54.62	3,179	230	52.5	5,913	53

* Imports relate to the first calendar year indicated.

16. There were approximately 44,500 acres under soft fruit in the U.K. in 1969/70, a decline of 3 per cent since the date of the last Examination. The areas under the principal crops were 17,800 acres for strawberries, 11,400 acres for blackcurrants, 9,000 acres for raspberries (of which nearly 7,800 acres were in Scotland) and 4,300 acres for gooseberries. The strawberry acreage has changed little since 1966/67. The raspberry acreage has increased by 15 per cent. in Scotland, and fallen by 11 per cent in England, since the last Examination, the net result being an overall increase of 10 per cent in the total U.K. acreage during the last 3 years. The blackcurrant and gooseberry acreages have declined by 7 per cent and 15 per cent respectively, although the decline in the blackcurrant acreage, which was very rapid during the first few years after it had attained its peak level of nearly 17,000 acres in 1963/64, has slowed down and in 1969/70 was actually reversed.

EARLY STRAWBERRIES

17. We have given particular attention to protected strawberries for the early market, and had hoped that the introduction, in the census return for June 1969, of a heading for strawberries grown under protection would yield some useful basic information on this rather specialized crop. There is, however, some doubt about the reliability of the returns for this new item, and it has not proved possible to draw any firm conclusions about the structural pattern for early strawberries as a crop.

18. The home strawberry crop does not begin to come on to the market in any quantity until May. Both the yield and the earliness of the crop are very variable, and the amount of home production in that month has ranged between 100 tons and 400 tons during the last four years. Imports come in at the rate of about 100 tons a month in April, and in some years as early as March or even February. By May imports often equal or exceed home production.

19. English strawberry production has substantial advantages in that the climate is favourable and the quality and flavour of the product good, and excellent varieties are available. At the same time, rising costs and increased competition are matters of serious concern to growers, and are diminishing the profitability of early strawberry production. The smaller grower is particularly vulnerable to increases in the cost of labour since he must compete not only with supplies from abroad but also with larger mechanized holdings in this country. Considerable effort has been devoted to bringing home production as far forward as possible into that period when prices for the late spring and early summer crop are at their highest, both by the use of polythene tunnels and other means of protection—a form of production which has, of course, a high labour requirement in relation to both acreage and yield—and by plantings of early varieties. Though the early English strawberry is of high quality, it is expensive enough for consumers to tend to regard it as a luxury or near-luxury purchase. A market of this nature is highly sensitive to fluctuations in supply, and traditional early growers are considerably concerned about the general trend towards increasing production by overseas competitors and in particular about the increased interest in protected cropping. Israel, for instance, has

TABLE 6

U.K. monthly home production and imports of strawberries 1966-69
('000 tons)

	February	March	April	May	June	July	August	September	October	Total
1966										
Home Production	—	—	—	0.4	16.2	21.8	...	—	—	38.4
Imports	...	0.1	0.1	0.3	0.3	...	...	...	—	0.8
Total	...	0.1	0.1	0.7	16.5	21.8	...	...	—	39.2
1967										
Home Production	—	—	—	0.2	8.6	37.9	0.2	0.1	—	47.0
Imports	0.1	0.3	0.3	...	...	...	...	0.7
Total	0.1	0.5	8.9	37.9	0.2	0.1	...	47.7
1968										
Home Production	—	—	—	0.1	7.6	36.4	—	0.1	—	44.2
Imports	0.1	0.4	0.2	...	...	...	...	0.8
Total	0.1	0.5	7.8	36.4	...	0.1	...	45.0
1969										
Home Production	—	—	—	0.4	6.8	45.7	...	0.1	0.1	53.1
Imports	...	0.1	0.1	0.3	0.5	...	...	...	—	1.0
Total	...	0.1	0.1	0.7	7.3	45.7	...	0.1	0.1	54.1

... Less than 50 tons.
— Nil or negligible.

become an exporting country in recent years, and with the aid of plastic coverings produces out-of-season strawberries between December and April; and it is believed that 20 per cent of the Dutch strawberry crop is now grown under some form of protection, and 7 per cent of the Italian and French crops. In these circumstances it may be more profitable for the home grower to concentrate on later maturing varieties and those covering a longer cropping season for sale to a wider public at lower prices and at a time of the year when the main production of early strawberries on the Continent is over. It has been suggested, for instance, that plant breeders might usefully consider the possibility of developing varieties suitable for cropping in August with the object of catching the main holiday trade at seaside and other resorts. Breeding of varieties suitable for this purpose is already being undertaken at John Innes Institute and forms part of the breeding programme at Long Ashton Research Station. The Scottish Horticultural Research Institute Unit at Auchincruive is also concerned with the breeding of August-cropping varieties in addition to double-cropping cultivars, similar to Redgauntlet, for use in the south. In some of the early production areas growers are already producing an outdoor crop of strawberries at the end of the summer and in early autumn. This is mainly the second crop from Redgauntlet which, in early districts, and given favourable weather conditions, will produce a worth while crop from the end of August on. In particularly favourable years a second crop of Redgauntlet is also harvested from open ground plants in the main crop areas of Kent.

RASPBERRIES

20. Scotland continues to dominate raspberry production in the U.K., providing 86 per cent of the total acreage and output in 1969/70. Over 90 per cent of the Scottish crop is produced in Angus and Perthshire, in what has been described as probably the most intensive raspberry growing area in the world. Other areas of production in Scotland are concentrated in the Moray Firth area and Lanarkshire, the latter specializing in raspberries for the dessert trade. In England, Kent is still the principal raspberry producing county, with a third of the England and Wales acreage. The total area of raspberries in 1969/70 was 9,090 acres: 7,796 in Scotland, 1,189 in England and Wales and 105 in Northern Ireland. In studying this crop, we have concentrated on Scottish production; but although the following comments are related primarily to production in Scotland, many of them would apply equally to the English industry, and there are some indications of a reviving interest in raspberries among English growers.

21. The heavy concentration of raspberry growing in the Dundee area has made possible a particularly close degree of integration between the research, production, marketing and processing interests, to the very considerable benefit of all sections of the industry. It has also exercised considerable influence over the structure of production, many of the Scottish growers being on a large scale and gearing their production and methods to the production of berries in bulk for processing.

22. Some 70 per cent of the Scottish raspberry acreage is planted with Malling Jewel. The new variety Glen Clova, bred at the Scottish Horticultural Research Institute and being made commercially available for the 1970/71

TABLE 7

Strawberries

U.K. production and imports

Year	Home Grown (Agricultural Holdings only)						Net Imports*		Total Supplies by Weight
	Total area acres	Bearing area gross yield cwt./acre	Output '000 tons	Growers' farm gate price £/ton	Value £'000	Total area value per acre £	Total quantity '000 tons	Total value £'000	Home grown per cent
1956/57 .	18,720	27.0	23.1	137.45	3,175	170	0.4	129	98
1957/58 .	17,983	34.8	28.5	154.07	4,391	244	0.3	114	99
1958/59 .	18,743	37.8	29.8	135.81	4,047	216	0.8	245	97
1959/60 .	18,257	46.1	36.4	128.18	4,664	255	0.7	237	98
1960/61 .	17,977	36.8	28.1	131.52	3,694	205	0.5	212	98
1961/62 .	16,338	49.4	34.5	134.00	4,623	283	1.0	330	97
1962/63 .	16,604	46.7	36.6	163.69	5,991	361	0.6	348	98
1963/64 .	16,785	46.4	34.6	170.55	5,901	352	0.6	372	98
1964/65 .	17,328	53.8	39.6	191.06	7,566	437	0.7	352	98
1965/66 .	18,008	44.0	33.6	156.96	5,274	293	0.6	441	98
1966/67 .	17,981	49.0	38.4	164.61	6,354	333	0.8	417	98
1967/68 .	17,647	54.5	47.0	153.43	7,211	409	0.7	378	99
1968/69 .	17,872	53.1	44.2	157.24	6,950	389	0.8	462	98
1969/70 .	17,804	61.7	53.1	182.07	9,668	543	1.0	612	98

* Imports relate to the first calendar year indicated.

planting season, is a vigorous grower and a prolific cane producer and is regarded as being a variety complementary to Malling Jewel. In breeding other new varieties, qualities of disease resistance and aphid resistance are receiving particular attention, as is also the need for a raspberry adaptable to machine harvesting. There is thought to be little merit in attempting to breed earlier-fruited varieties, since to bring forward the raspberry season would mean entering into competition with strawberries, to the detriment of both crops. Once a satisfactory means of mechanical harvesting is available, efforts might usefully be directed to the breeding of later-fruited varieties for harvesting after mid-August in Scotland—the date at which picking labour there becomes scarce. Although various tests have been carried out on an American harvester and on prototype British machines, work on the development of a mechanical harvester has not yet succeeded in producing a commercial machine which operates effectively under Scottish conditions.

23. It is estimated that some 5 per cent of the Scottish crop is sold as dessert fruit. In many of the English markets, supplies are insufficient to meet demand, and the dessert fruit trade appears to have considerable potential in spite of the raspberry's short shelf life. Two of the main obstacles to its development lie in the cost of transport and the need for selective picking. It is possible that the development of mechanical harvesting might indirectly ease this last difficulty by releasing labour which could be channelled into hand-picking the best quality berries for the fresh market.

24. The processing outlets include raspberry pulp, either frozen or preserved with SO_2 , for use in jam making, flavouring of yoghurt and ice-cream, etc.; canning; and deep-frozen table raspberries. There is likely to be a considerable reduction in the use of pulp preserved with SO_2 , but the freezing of raspberry pulp is increasing with the developments in the building of large cold stores and with advances in freezing techniques. There is an export market for frozen pulp which could well be expanded in countries to which refrigerated shipping services are available, including at present the USA and Canada. There may also be a potential market for frozen whole raspberries in these countries if flow freezing capacity is increased. Improvements in mechanical harvesting in the USA may, however, reduce export opportunities in that country for British growers in a few years time. With canned raspberries, the main limiting factor is canning capacity during the short harvesting period. The canned raspberry must however compete with deep-frozen raspberries. The blast-freezing system, which is most widely used at present, often produces a relatively unattractive pack with the fruit sticking together and tending to break on thawing. The more expensive flow freezing method using liquid nitrogen gives a product of higher quality and more attractive appearance. Only about 60 tons of raspberries were frozen by this method in 1969, but it is understood that there are proposals for further nitrogen freezing lines which might increase the capacity in Scotland to 600 tons or so.

25. The small grower with a small labour force is well placed to control the quality of the berries being picked and to select the highest quality for the fresh trade. A counterbalancing disadvantage of such small scale operation is of course the grower's inability to keep up a steady supply of fruit in the quantity demanded by large wholesalers or supermarkets. It is

interesting to note that a producer-owned marketing co-operative which was formed in 1960 in the Perth/Angus production area with an initial membership of 60 growers now has about 250 members and has been successful in selling fruit in the English markets and in supplying its members' requisites.

TABLE 8
Raspberries
U.K. production

Year	Home Grown (Agricultural holdings only)					
	Total area	Bearing area gross yield	Output	Growers' farm gate price	Value	Total area value per acre
	acres	cwt/acre	'000 tons	£/ton	£'000	£
1956/57. . .	9,718	46·7	21·6	142·15	3,070	316
1957/58. . .	10,295	30·2	5·1	137·28	2,073	201
1958/59. . .	10,642	30·6	14·4	134·72	1,940	182
1959/60. . .	10,952	38·6	18·4	104·88	1,927	176
1960/61. . .	10,267	43·6	18·6	75·32	1,403	137
1961/62. . .	8,921	27·1	11·3	109·86	1,239	139
1962/63. . .	8,147	31·8	12·3	126·83	1,560	191
1963/64. . .	8,068	35·8	13·3	144·89	1,927	239
1964/65. . .	8,434	36·2	14·8	153·85	2,277	270
1965/66. . .	8,415	30·6	12·5	118·64	1,483	176
1966/67. . .	8,229	32·1	12·9	154·88	1,998	243
1967/68. . .	8,337	27·4	11·1	160·00	1,776	213
1968/69. . .	8,995	35·8	15·4	152·60	2,350	261
1969/70. . .	9,090	42·0	18·3	160·87	2,944	324

Imports not separately distinguished.

BLACKCURRANTS

26. Blackcurrants, unlike strawberries and raspberries, are grown very little in Scotland and Northern Ireland, although some research effort in Scotland has been devoted to the breeding of a freely cropping and disease-resistant variety. The census returns for June 1969 showed 8,280 acres of blackcurrants grown for processing in England and Wales and 2,888 acres for the fresh market. The actual destination of the crop will have depended on the relative profitability of the alternative outlets at the time of picking, where the crop is not under contract.

27. Since 1967, the acreage in Hereford—the leading county in the production of blackcurrants for processing, and second only to Norfolk in the total area of blackcurrants—has increased from 1,730 acres to 2,048 acres, whereas in most counties the acreage has been falling. Apart from this, there has been no significant change in the pattern of distribution since 1967, and in spite of their generally declining popularity, blackcurrants continue to account for a very substantial proportion of the soft fruit acreage in many counties: 78 per cent in Hereford, 55 per cent in Suffolk, between 40 per cent and 50 per cent in Essex and Worcester, and over 30 per cent in Norfolk.

28. Blackcurrants are highly susceptible to frost damage and cold weather at flowering time. In the quite exceptionally bad season of 1967/68 the

yield fell to under 13 cwt per acre of the U.K. bearing area, giving an output of under 7,000 tons, whereas the 1969/70 yield is estimated at just under 46 cwt. per acre and the output at over 24,000 tons. The processing industry has a considerable storage capacity, however, and can to some extent absorb these fluctuations in supply, and hence exercise a stabilising influence on the prices received by the grower. The demand for blackcurrants for processing has declined very substantially in recent years, and is the main cause of the fall in acreage. Blackcurrant jam has fallen in popularity, and sales of juice have fallen off under the influence of the purchase tax on soft drinks, although there seems to be an increasing demand for blackcurrants for pie filling and to some extent for canning.

29. Attempts to produce new and more productive varieties have not so far met with any very great success, although some new cultivars show certain signs of promise. There have, however, been improvements in productivity as a result of the increased use of herbicides, the availability of virus-free stocks and, in some areas, greater attention to irrigation. The prevention of frost damage and a reduction in the labour requirements of harvesting offer the greatest scope for further improvements in productivity. The use of water sprinkling for frost protection adds appreciably to production costs and is of course dependent on adequate water supply and drainage. It may be that the solution of the problem of frost damage must await the development of a later flowering variety. The problems of mechanical harvesting are receiving much attention and, although the present commercial machines requiring the destruction of the whole or part of the bush are not entirely satisfactory, recent developments both by the N.I.A.E. and with a commercial prototype for harvesting from the standing bush show considerable promise. For the time being hand picking remains the principal method of harvesting and seasonal labour is both costly and, in many areas, difficult to obtain.

TABLE 9
Blackcurrants
U.K. production

Year	Home Grown (Agricultural holdings only)					
	Total area	Bearing area gross yield	Output	Growers' farm gate price	Value	Total area value per acre
	acres	cwt/acre	'000 tons	£/ton	£'000	£
1956/57.	10,731	24.4	11.2	163.53	1,832	171
1957/58.	11,758	28.0	14.6	165.48	2,433	207
1958/59.	12,620	38.1	21.1	171.33	3,615	286
1959/60.	13,181	27.8	16.2	166.44	2,692	204
1960/61.	13,966	31.9	19.9	167.76	3,340	239
1961/62.	14,575	32.1	19.6	171.48	3,361	231
1962/63.	15,719	32.6	21.8	164.45	3,585	228
1963/64.	16,958	40.9	29.9	123.18	3,683	217
1964/65.	16,061	37.4	28.0	109.11	3,055	190
1965/66.	14,078	44.0	28.2	111.63	3,148	224
1966/67.	12,271	28.8	17.1	157.25	2,689	219
1967/68.	11,263	12.6	6.8	238.24	1,620	144
1968/69.	11,180	26.2	13.1	221.45	2,901	259
1969/70.	11,431	45.9	24.2	150.50	3,642	319

30. Gooseberries, like blackcurrants, are predominantly an English crop, over half the total acreage lying in Kent, Norfolk and Cambridge. There are relatively sizeable acreages (328 and 241 acres respectively, at June 1969) in Worcestershire and Huntingdonshire.

31. Most of the crop goes for processing (canning, pie fillings and jam), although a fair proportion is still sold on the fresh market. The gooseberry has a certain advantage over other soft fruits, since it is relatively easy to pick, does not easily bruise, and has a somewhat longer shelf life than other fruits; these last advantages are related to the fact that it is marketable for domestic and other consumption while it is still unripe, and therefore resistant to damage in transit. Although the gooseberry is readily frozen, quick-frozen gooseberries are unlikely to be an economically attractive proposition for retail sale.

32. Like other soft fruits, the crop can be devastated by birds, and an effective bird repellent is highly desirable. Pesticides have to be used with discretion, and many processors will not buy gooseberries unless they can be guaranteed free of certain chemicals, e.g. D.D.T. Picking is at present done by hand, and there do not seem to be any immediate prospects of a mechanical harvester being produced.

General comments on the marketing of soft fruit

33. The high cost of transport, and of distribution in general, have made it necessary for growers to explore new or hitherto little-used methods of marketing their produce, and the last few years have seen rapid developments in direct grower-to-consumer sales. Roadside sales have received considerable impetus from the greater mobility of the public and the increasing tendency on the part of many consumers to like fresh produce direct from the source of supply rather than through the hands of one or more middlemen. A number of growers, usually with relatively small acreages, have taken advantage of this to build up a regular clientèle or in appropriate areas to profit from the tourist trade, and offer not only fruit but also quite a variety of home produced or bought-in-produce—vegetables, eggs, mushrooms, etc. Other growers have had considerable success with 'pick it yourself' sales, particularly in selling the later part of the strawberry crop and blackcurrants and raspberries. Roadside sales still represent only a small proportion of total sales, and cannot be considered a general alternative to traditional methods of marketing and distributing, but for small growers within driving distance of urban areas, there is scope for further extension of direct selling of this kind, given due attention to encouraging the growth of the market by supplying it with produce of good quality.

34. The increasing trade in convenience food and the development of new or improved processing techniques are of major interest to the grower of so perishable a product as soft fruit. Canned fruit has the great advantage of being easily transportable and of offering a convenient way of storing fruit, both domestically and for the trade, without requiring elaborate or expensive storage facilities. The main limiting factor is the availability of canning capacity during the comparatively short season in which the different

TABLE 10

Gooseberries

U.K. production and imports

Year	Home Grown (Agricultural Holdings only)						Net Imports*	
	Total area acres	Bearing area gross yield cwt/acre	Output '000 tons	Growers' farm gate price £/ton	Value £'000	Total area value per acre £	Total quantity '000 tons	Total value £'000
1956/57	5,987	48.1	13.9	71.65	996	166	0.1	10
1957/58	6,033	46.8	13.6	74.04	1,007	167	...	3
1958/59	5,748	60.2	16.5	77.49	1,277	222	...	3
1959/60	5,691	44.6	12.0	76.01	915	161	...	3
1960/61	5,903	44.3	12.3	86.03	1,057	179	0.1	7
1961/62	5,728	55.1	14.9	82.95	1,236	216	0.1	18
1962/63	5,732	47.1	13.1	89.16	1,168	204	0.1	7
1963/64	5,887	57.8	16.2	79.69	1,290	219	NSD	NSD
1964/65	5,657	41.4	11.1	84.14	934	165	"	"
1965/66	5,393	62.9	15.9	59.94	953	177	"	"
1966/67	5,033	45.3	10.9	83.94	915	182	"	"
1967/68	4,692	33.4	7.4	112.84	835	178	"	"
1968/69	4,457	57.3	12.3	108.37	1,333	299	"	"
1969/70	4,286	66.0	12.7	92.05	1,169	273	"	"

* Imports relate to the first calendar year indicated. NSD Not separately distinguished.
... Less than 50 tons.

types of home-produced soft fruit come in. Where fruit is wanted for jam or flavouring, many processors find it possible to overcome this particular difficulty by freezing the pulped fruit and holding it in cold store until the off-season. Pulp-freezing for later processing has been greatly encouraged by the rapid increase in cold storage capacity while the production of deep-frozen retail packs of fruit, particularly raspberries for table use, might be further stimulated by the development and adoption of new processes involving the use of liquid nitrogen supported by the widespread use of deep freeze cabinets in retail shops. When it comes to marketing fresh fruit, many growers have found the installation of precooling chambers for the extraction of field heat a considerable asset, as also is the use of refrigerated rail or road transport where the grower, either alone or in co-operation with other growers, has enough produce to fill the refrigerated container. These more sophisticated processing and storage techniques may offer opportunities for exporting soft fruit beyond its traditionally rather limited range. Equally however they must deprive the soft fruit grower of some of the natural protection from imports which a perishable product otherwise enjoys on its home market.

Record of Study by the Vegetables Group

1. The value of the total vegetable output in the U.K. has risen from £104 million at the time of the last Examination (1966/67) to an estimated £129 million in 1969/70. Its value in relation to other horticultural produce remains unchanged however at about 57 per cent of the total horticultural output.

2. We have made a special study of cauliflowers, brussels sprouts, carrots, leeks, outdoor lettuce, celery, rhubarb, asparagus and watercress. These nine crops cover between them almost one-third of the total acreage of outdoor vegetables.

3. We have tried to foresee future trends and to indicate the main directions in which further investigation or development would seem likely to be most profitable. The search for new varieties and techniques which will give better yields, control of quality, size and maturity date is a continuing one. Major technical breakthroughs, which could influence any of these factors, can occur at any time but they can seldom be forecast. There is clearly scope for greater mechanization in the cultivation, particularly the harvesting, of many crops whilst experimentation into plant density and spacing is another field in which further improvements may be expected in the future. For instance, the establishment of carrot plants spread at one inch square over the whole field could, theoretically, give three times the best possible yield at present and better uniformity. Growers would however be well advised to look particularly to the marketing side of their businesses to help increase their profitability. Improvements are still possible in the packaging and handling of vegetables, and in particular in the development of controlled-temperature storage, both on the farm and during transit. The demand for processed vegetables is of particular significance, as pointing both to an expanding market for growers to exploit and to a field in which competition from

imports may be keen. Although the long-term trend is undoubtedly towards greater use of convenience foods, there is currently some movement towards greater use of fresh vegetables, including fresh pot-prepared vegetables.

CAULIFLOWERS

Production

4. Cauliflowers account for some 8 per cent of the total acreage and 10 per cent of the total value of outdoor vegetables in the U.K. Their estimated cropped area in 1969/70 was 41,185 acres with an output worth £9½ million. This acreage is very similar to that in 1966/67 although in the two intervening years it had risen to over 45,000 acres. Yields vary quite considerably from one year to another, but no longer show indications of the general upward trend.

5. Cauliflowers of good quality demand a friable fertile soil. Heavy clays, for instance, restrict root development. The main producing areas are in Lincolnshire, Kent, Cornwall and Lancashire. In Cornwall winter cauliflower forms an important part of the county's economy, the climate being particularly suitable for the crop. The Cornish growers are, however, finding the difficulties of transport to the markets an increasing handicap against competition from exporters in Brittany.

6. Cauliflowers tend to be grown as part of a regular rotation. They are not an 'opportunity' crop, in the sense of one which growers are inclined to undertake one year and leave alone the next on the basis of their estimates of changing market conditions. They are greatly affected by climatic conditions, and short-term gluts or shortages frequently occur in response to changes in the weather.

7. Although cauliflowers are grown in relatively large plantings, existing varieties mature over too long a period to permit mechanized harvesting. This spread of the harvesting period is not, of course, unwelcome to growers in other ways, and indeed most of them grow several types and varieties of cauliflower for the specific purpose of spreading the harvest over as long a period as possible. Nevertheless, a long harvesting period from a single crop involves a lot of small cuts and numerous journeys up and down the rows. The ideal would be a succession of crops maturing evenly so that the harvest periods are short. A break-through on this would appreciably reduce labour costs and facilitate mechanized harvesting.

8. Cauliflower seedlings are raised under glass for the early summer crop. There are advantages with direct drilling but plants for the summer, autumn and winter crops can be, and usually are, raised outdoors satisfactorily and cheaply without taking up glass that could be used for higher value crops. Pot-grown plants are superior in root growth, ease of establishment and quality of product for the early season. Some growers consider that the future trend will be towards frame-raising cauliflowers for all seasons of the year.

Seed

9. Cauliflower varieties of good quality are available from British, Australian and Dutch sources, but when these are multiplied a long distance from

the parent seed house, e.g., in Mediterranean countries, there may be lack of expert technical supervision and a consequent loss of uniformity. The British climate is not good for cauliflower seed production, particularly of summer and autumn varieties.

Handling and processing

10. As a vegetable which can be obtained all the year round and which needs very little preparation before cooking, cauliflowers are sold almost entirely on the fresh market. There are, moreover, technical difficulties associated with the canning of all brassicas and there is therefore little incentive for the processors to handle this crop. A certain amount of segmented portions of cauliflower are frozen as convenience packs, principally for hotels and airlines and also for limited sales in supermarkets. Cauliflowers for freezing must be small and the further development of new techniques for producing small curds which do not require segmenting may be a development which will encourage the expansion of sales of frozen cauliflowers. There is some import of cauliflowers for processing—mainly for use in mixed pickles—from Eastern European countries. A heavier type of curd is required for this last purpose, but suitable varieties are available in this country; in 1969/70 5,400 tons of home-grown cauliflowers were used in this way against 4,000 tons imported.

11. The cauliflower is easily damaged in handling, and many growers find that the non-returnable containers now in use do not give the same protection as the old rigid containers. Remedies which could be adopted by growers to reduce the likelihood of damage are trimming down, single-layer packs, rigid outer bulk containers and the mechanical handling of containers.

Research

12. The following have been suggested as areas in which further research or experiment might help the industry:

The quality of cauliflowers varies greatly from season to season, but it is not known how far this is attributable to climatic conditions and how far to genetic factors.

As with all brassicas, club root is still a problem; cabbage root fly has developed resistance to the organo-chlorine insecticides and the organo-phosphorus compounds are now the only effective materials available to control it.

The sprays now used for weed control have not a very wide spectrum individually and also tend to retard the growth of crops and produce an inferior head.

Research into the problem of short-term storage might help to overcome the marketing difficulties arising from the short-term glut and shortages to which the crop is subject. The maintenance of adequate humidity is one of the difficulties of cold storage, and if the crop is allowed to become at all desiccated it loses its fresh and attractive appearance.

TABLE 11
Cauliflowers (including Broccoli)
U.K. production and imports

Year	Home Grown (Agricultural Holdings only)						Net Imports*		Channel Islands		Total Supplies by Weight
	Cropped area	Gross yield	Output	Growers' farm gate price	Value	Value per acre	Total quantity	Total value	Total quantity	Total value	Home grown
	acres	tons/acre	'000 tons	£/ton	£'000	£	'000 tons	£'000	'000 tons	£'000	per cent
1956/57	34,111	6.7	224.1	31.91	7,151	206	25.3	1,360	0.9	40	90
1957/58	38,653	5.9	205.4	28.90	5,937	154	28.2	1,117	3.1	130	87
1958/59	40,040	6.4	234.3	26.54	6,218	155	38.1	1,942	4.8	228	84
1959/60	39,739	5.6	204.6	27.81	5,690	143	44.9	2,044	8.1	406	80
1960/61	44,937	6.0	241.0	30.02	7,234	161	35.3	1,645	15.6	692	83
1961/62	46,681	6.0	249.7	39.56	9,877	212	29.2	1,192	6.7	320	88
1962/63	45,802	4.2	169.7	36.78	6,242	136	33.7	1,738	11.9	574	79
1963/64	44,306	7.3	300.2	33.28	9,992	226	16.5	1,294	6.3	321	93
1964/65	40,010	8.0	305.8	34.65	10,597	265	26.5	1,382	4.9	248	91
1965/66	43,880	7.8	322.8	31.22	10,078	230	29.5	1,524	15.0	646	88
1966/67	40,977	8.2	325.3	35.94	11,691	286	26.0	1,581	6.2	346	91
1967/68	45,474	7.8	334.7	37.64	12,597	277	28.3	1,749	15.8	789	88
1968/69	45,456	6.7	285.3	35.92	10,247	225	23.8	1,583	16.0	922	88
1969/70	41,185	7.2	274.7	34.19	9,393	228	42.2	3,025	13.5	850	83

* Imports relate to the first calendar year indicated.

Production

13. The estimated cropped U.K. acreage of Brussels sprouts which in 1966/67 was at its lowest level for many years (37,500 acres) had risen to 49,200 acres by 1969/70, with a total output valued at £10.6 million. Considerably higher prices in 1969/70 reflected the much better quality of the sprouts compared with 1968/69. In addition, oversupplied markets in the autumn of 1968 depressed prices.

14. At the time of the last Examination, Bedfordshire was growing 27 per cent and Worcestershire 10 per cent of the total crop in England and Wales. In both these counties the acreage was slightly lower in September 1970 than it had been three years earlier. Although Bedford is far and away the leading county in the production of sprouts with 22 per cent of the England and Wales crop, Worcestershire (8 per cent) is now exceeded by Lindsey with 9 per cent, followed by the Holland division of Lincolnshire (8 per cent) and Norfolk (6 per cent). In Scotland, East Lothian now have 66 per cent of the total Scottish acreage, compared with 63 per cent in 1967. The 1969 census in England and Wales distinguished for the first time between the acreage under sprouts for marketing fresh and for processing: at September 1970 the respective acreages were 41,704 and 10,312. Lindsey and Norfolk are the chief areas for the production of sprouts for processing, providing between them almost half the total acreage under this crop.

15. Research has produced many new varieties of sprouts over the last 10 years, including the modern, and expensive, F1 Hybrids. Some growers still save their own seed, but the practice is declining. Direct drilling of seed makes for saving of labour at planting time. Establishment of a full plant is more difficult with direct drilling than with transplanting, but yield and quality resulting from either method can be equally good when both are well carried out.

16. The increased area of sprouts has come mainly from growers new to the crop rather than from an expanded production by experienced growers. Inexperience can result in reduced quality and poorer grading and presentation with a resultant depression in price from the whole of the product.

Harvesting

17. Hand picking is the biggest single item in production costs, and is said to amount to about £60 an acre for a 4-ton crop. During the last two or three years a larger number of commercial holdings have been experimenting with the single-harvesting technique, but success depends on careful planning of production to a close week-by-week timetable and avoidance of waste through the exercise of great care in growing the right kind of plant for the picking machine. The mechanical strippers available at present do not offer a saving in cost of harvesting.

Packing and marketing

18. After picking, the crop may be graded into different qualities either in the packhouse or, more cheaply, by the pickers in the field. Some growers are prepacking in 1 lb or 2 lb nets for sale by supermarkets. The cost of packing such small units is, however, relatively high and sprouts netted in such small quantities have only a very short shelf life since they dry out quickly. Pre-packaging in polythene, on the other hand, is unsatisfactory because moisture condenses in the bag.

19. Most fresh sprouts are sold through the wholesale markets. Improved facilities for overnight storage at wholesale markets would be welcome. Short-term storage facilities at the point of production would help to even out gluts and shortages but, with the storage of most leafy vegetables, it is difficult to ensure the right degree of humidity.

Processing

20. Processing has increased rapidly in recent years. As already noted, one-sixth of the total acreage of sprouts in England and Wales is now grown for processing. It is estimated that 20,000 tons of sprouts were grown for processing in 1969/70, compared with 5,000 tons a few years ago, although growers regard it as uncertain whether production for processing will continue to increase at this rate, or perhaps even maintain its recent levels. A large proportion of the crop for processing is grown under contract. This means growing the sprouts to a fairly close specification; sprouts which are rejected by the processors as being too large are, however, well trimmed and of good quality making attractive packs for sale on the fresh market. Although the price realized is lower than that paid by the processor, such packs, nevertheless, sell at the upper limit of prices prevailing on the wholesale market. With the precision techniques now available however a good grower can produce about 90 per cent of his crop within the specified grade.

21. There has been a certain amount of experiment with dehydrated sprouts, but little interest has been shown commercially in this form of processing.

Demand for fresh sprouts

22. Prices of sprouts fall sharply when spring greens come onto the market, and the strength of demand in the early spring depends very much on the availability of these and other alternative greenstuffs. There is, however, a surprisingly strong demand towards the end of the summer and growers are increasingly interested in varieties and techniques by which the season might be extended to cover the whole of the period July to April inclusive.

TABLE 12
Brussels sprouts
U.K. production

Year	Home Grown (Agricultural Holdings only)					
	Cropped area	Gross yield	Output	Growers' farm gate price	Value	Value per acre
	acres	tons/acre	'000 tons	£/ton	£'000	£
1956/57. . . .	49,135	3.9	171.4	29.91	5,127	104
1957/58. . . .	42,527	3.3	131.8	39.70	5,233	123
1958/59. . . .	45,108	3.6	156.4	40.67	6,361	141
1959/60. . . .	46,282	2.9	119.0	41.15	4,897	106
1960/61. . . .	47,346	4.0	163.2	36.61	5,974	126
1961/62. . . .	49,611	3.1	135.3	49.69	6,723	136
1962/63. . . .	50,331	3.0	149.2	44.68	6,667	132
1963/64. . . .	47,473	4.4	178.3	34.41	6,136	129
1964/65. . . .	45,190	3.7	161.5	43.62	7,044	156
1965/66. . . .	42,563	4.3	178.7	33.46	5,979	140
1966/67. . . .	37,501	4.6	170.6	50.66	8,643	230
1967/68. . . .	44,303	4.1	179.0	50.55	9,049	204
1968/69. . . .	49,830	3.9	184.1	47.20	8,689	174
1969/70. . . .	49,191	4.0	193.2	55.10	10,646	216

Imports not separately distinguished.

CARROTS

Production

23. The estimated cropped U.K. acreage of carrots has risen steeply during the last three years, from 28,500 acres in 1966/67 to 43,300 acres in 1969/70, a figure of more than 8 per cent of the total open-grown vegetable acreage in the U.K. The output in 1969/70 was valued at £7.1 million.

24. There has been no significant change in the general pattern of distribution in England and Wales since the last Examination. The bulk of the crop still comes from East Anglia, with secondary but still quite substantial acreages in Lancashire, Lincolnshire (Lindsey) and the East and West Ridings of Yorkshire. There has, however, been a noteworthy expansion of carrot production in Scotland, north of the Tay, which has brought the total acreage in Scotland up to 1,799 acres in June 1969, compared with 882 acres three years earlier. This expansion has been encouraged by the local processing factories which are anxious to make full use of their capacity; and the crop has been particularly popular with the larger growers on account of the ease with which it lends itself to mechanization. There may well be scope for further expansion in the area, where the proposed closing of the sugar-beet factory at Cupar will leave some 14,000 acres available for other crops.

25. In England and Wales separate statistics are now collected for early carrots (i.e., those intended for marketing by mid-September), main crop

carrot and carrots for processing. The acreage devoted to each of these in June 1969 was:

	<i>Acres</i>	<i>Per cent</i>
Early carrots	4,446	11
Maincrop carrots	26,048	65
Carrots for processing	9,573	24
	<hr/> 40,067 <hr/>	<hr/> 100 <hr/>

Demand and marketing

26. Home grown carrots have a long marketing season. During their short off-season, the demand for high quality carrots is met from imports, and over the last three years total imports of fresh carrots have averaged 29,000 tons per annum, about 6 per cent of total supplies. The report which the EDC for Agriculture published in 1968 on Agriculture's Import Saving Role suggested that imports might be reduced, and that the frequently quite considerable wastage of surpluses from home production might also be reduced, if—amongst other things—it were possible to devise new storage techniques which would improve the quality of the home crop at the end of the season. It does not, however, seem to the Group that it is yet economic or practicable to store maincrop carrots in a condition to compete with imports for the high-price spring market. Carrots are not an easy crop to handle or store. If they are allowed to dry after lifting it is difficult to restore them to the 'bright' condition which the quality market demands, and for economic reasons current research has concentrated on ventilated rather than refrigerated storage. Short-term storage is undoubtedly useful in giving continuity of supply, but although longer-term storage is technically possible it is not yet economic except in special circumstances. In peat areas carrots can be earthed up and left in the ground without serious damage until as late as April if temperatures do not fall too low, and until research into more elaborate techniques has advanced further, most growers will no doubt continue to rely on this cheap and reasonably effective method of storage. Late attack by carrot fly is a hazard here.

27. Demands by processors, particularly for canning whole, are increasing. Processors require their carrots to be produced within certain size limits ($\frac{3}{4}$ in. to $1\frac{1}{4}$ in. for canning whole, and 2 in. and over for slicing and dicing); these are not unduly restrictive, since it is possible to grow between 50 per cent and 60 per cent of a particular crop within the $\frac{3}{4}$ in.- $1\frac{1}{4}$ in. limit. The problem is that much of the remainder of the crop, although of good quality, finds its way to the wholesale market and at times depresses prices. It is very difficult to forecast how far processing will continue to expand, but the grower members of the Group are of the opinion that it might be expected to level out within the next two or three years.

28. Although there is an increasing demand for processing, the wholesale market is at times over-supplied, and carrots must be regarded as something of a gamble for the grower, giving him sometimes an exceptionally profitable crop and sometimes a heavy loss.

TABLE 13

Carrots

U.K. production and imports

Year	Home Grown (Agricultural Holdings only)						Net Imports*		Total Supplies by Weight
	Cropped area	Gross yield	Output†	Growers' farm gate price	Value	Value per acre	Total quantity	Total value	
	acres	tons/acre	'000 tons	£/ton	£'000	£	'000 tons	£'000	per cent.
1956/57 .	33,737	11.5	313.4	9.97	3,124	93	22.2	991	93
1957/58 .	27,536	8.7	223.9	17.55	3,929	143	16.9	842	93
1958/59 .	34,685	11.0	343.1	10.14	3,479	100	24.0	1,256	93
1959/60 .	29,712	10.5	281.8	13.09	3,688	124	32.5	1,423	90
1960/61 .	36,213	15.9	383.5	8.57	3,286	91	22.8	1,170	94
1961/62 .	29,474	8.7	225.2	19.29	4,344	147	18.8	974	92
1962/63 .	33,121	8.9	264.0	13.78	3,637	110	41.5	2,614	86
1963/64 .	32,397	15.7	417.9	9.75	4,075	126	84.1	5,200	83
1964/65 .	27,814	14.6	323.6	12.32	3,987	143	26.5	1,413	92
1965/66 .	24,634	14.0	284.5	16.30	4,637	188	23.8	1,429	92
1966/67 .	28,513	16.7	406.9	11.42	4,645	163	38.2	2,364	91
1967/68 .	30,379	16.2	398.3	12.67	5,047	166	28.5	1,553	93
1968/69 .	35,774	15.9	432.4	17.58	7,603	213	24.4	1,644	95
1969/70 .	43,290	16.1	540.2	13.13	7,095	164	34.3	2,357	94

* Imports relate to the first calendar year indicated.

† Does not include small quantities from the Channel Islands.

Production

29. Leek plantings have continued their upward trend, and in 1969/70 the estimated cropped area reached a total of 3,028 acres in the U.K. compared with 2,384 acres in 1966/67. There was a particularly large increase in acreage, of nearly 500 acres, between 1968/69 and 1969/70. The total value of the output was £1.6 million.

30. Scottish growers with a total of 436 acres have a higher proportion (14.4 per cent) of the total U.K. acreage of leeks than of most other vegetables. Leeks grow best in light soil or a light medium loam; on heavier land, they are difficult to harvest during the winter. The harvesting period in the Vale of Evesham, where there is a large concentration of production, lasts from late August to May. One of the subsidiary advantages of the crop is that it leaves the land in a friable condition if it is harvested and carried off by hand.

31. Leeks are normally raised in seed beds, with or without protection, and planted out from May onwards. They can be sown direct into their permanent quarters as a standing crop, but it is then possible to get only one crop a year from land that could otherwise be double cropped. The crop is an expensive one to grow, having a high input of labour for planting, harvesting and market preparation, although weed control is a comparatively simple matter with modern herbicides. Mechanical planting has been tried, but is not successful in all types of soil; the machine tends to drag the root and produce a J-shaped leek. Irrigation is essential if a heavy crop is to be secured for the beginning of the season, when demand and prices are high.

32. Pre-packaging in polythene has not so far been successful because of the problem of condensation. Leeks have, however, the advantage of staying fresh for several days after lifting, and can be bundled into consumer packs and sold without wrapping.

TABLE 14
Leeks
U.K. production

Year	Home Grown (Agricultural Holdings only)					
	Cropped area	Gross yield	Output	Growers' farm gate price	Value	Value per acre
	acres	tons/acre	'000 tons	£/ton	£'000	£
1956/57.	2,093	9.9	17.7	22.71	402	192
1957/58.	1,851	9.0	16.2	27.72	449	243
1958/59.	1,744	10.1	17.2	30.61	526	302
1959/60.	1,693	10.0	16.0	37.25	596	352
1960/61.	2,204	9.8	19.7	29.24	576	261
1961/62.	1,992	9.2	18.1	48.12	871	437
1962/63.	2,149	8.3	17.3	63.18	1,093	509
1963/64.	2,135	9.9	21.0	38.71	813	381
1964/65.	1,945	9.1	17.2	56.16	966	497
1965/66.	2,315	9.5	21.5	44.60	959	414
1966/67.	2,384	9.6	22.6	47.21	1,067	448
1967/68.	2,455	9.7	23.1	54.94	1,269	517
1968/69.	2,568	9.1	22.5	68.76	1,547	602
1969/70.	3,028	8.9	26.1	63.18	1,649	545

Production

33. The estimated cropped acreage of open-grown lettuce reached a peak figure of 18,241 acres in 1969/70, an increase of over 16,000 acres since 1966/67. Output was valued at £8.2 million, almost 9 per cent of the total value of vegetable crops grown in the open.

34. Over-wintered lettuce is gradually being replaced by lettuce grown with protection or raised under glass and transplanted into the open ground, a method of production which enables a large proportion of the crop to be brought to the 8 ounce size for which there is a growing demand.

35. The development of chemical control of pests, in particular aphid and root aphid, has made it possible to produce good quality crops throughout the season, provided shortage of water is not allowed to inhibit growth. Lettuce is particularly susceptible to dry growing conditions, and although it can be grown successfully without irrigation, it is nevertheless advantageous to irrigate and indeed essential to do so on some soil types.

Demand and Marketing

36. Over the last 10 to 20 years there has been a large increase in demand for lettuce and other salad crops during the winter months. In this country, the crop is still grown very largely on market garden holdings within easy reach of town and city markets. Even so, there is considerable difficulty in getting to the shops in good condition the crisp lettuce which domestic consumers tend to prefer to the round type of lettuce. With transport to distant markets these difficulties can be overcome if the lettuce can be kept cool throughout the whole distributive chain. In America, lettuce grown in the warm climate of California is put into coolers as soon as it is harvested, transferred to refrigerated transport for its long journey across the continent to New York, and put into cool cabinets as soon as the retailer receives it.

37. Vacuum cooling has been applied to lettuce for some 20 years in the United States. Some vacuum-cooled Dutch lettuce is sold in the U.K. through a large group of chain stores. This lettuce, which is glasshouse-grown, is loaded into pre-cooled containers after being itself vacuum-cooled in pallets, trans-shipped to the U.K. overnight and taken direct to the retailers' depots. The high cost of this method of distribution is presumably justified by the very high quality of the produce and the fact that its marketing season lasts for many weeks, if not months. Although some growers of outdoor lettuce have shown an interest in the possibility of vacuum cooling, the distribution system is not yet ready to receive and handle this type of produce and as far as we are aware the technique has never been adopted in this country. The reasons for this are not, however, far to seek. The initial cost of the equipment is fairly high, and for pallet-loading the size of the vacuum units has to be fairly large. It is difficult to visualize at what dispatch points in the U.K. lettuce would be available in sufficient quantity and over a sufficiently long period to warrant such an installation, quite apart from the associated need for

insulated or at least protected transport from the cooling plant to the market. If any inexpensive vacuum cooling installations becomes possible there might be scope for its use in this country, but even so it would have to be from large production units or groups of units.

TABLE 15
Lettuce (open)
U.K. production

Year	Home Grown (Agricultural Holdings only)					
	Cropped area	Gross yield	Output	Growers' farm gate price	Value	Value per acre
	acres	tons/acre	'000 tons	£/ton	£'000	£
1956/57 . . .	14,763	5.6	67.3	47.47	3,195	216
1957/58 . . .	15,052	4.8	67.4	46.45	3,131	208
1958/59 . . .	14,393	6.4	73.5	44.90	3,300	229
1959/60 . . .	15,149	5.5	78.5	64.32	5,049	333
1960/61 . . .	15,609	7.0	93.6	55.27	5,173	331
1961/62 . . .	16,861	6.6	105.6	65.19	6,884	408
1962/63 . . .	16,578	7.1	99.1	49.82	4,937	298
1963/64 . . .	14,665	7.2	95.0	50.35	4,783	326
1964/65 . . .	14,909	7.6	107.1	48.92	5,239	351
1965/66 . . .	15,890	7.7	106.6	48.43	5,163	325
1966/67 . . .	16,579	7.8	121.8	60.66	7,388	446
1967/68 . . .	16,140	7.4	113.5	55.59	6,310	391
1968/69 . . .	17,921	6.8	105.1	69.31	7,284	406
1969/70 . . .	18,241	6.7	109.3	74.95	8,192	449

Imports: It is not possible to determine precisely whether or not imported lettuce is grown under glass, either heated or unheated, or in the open. However, as the imports arrive mainly during the months of November to April they have been regarded as supplementing supplies of homegrown heated lettuce. See Table 23.

CELERY

Production

38. In 1969/70 the estimated cropped area of celery in the U.K. was 5,329 acres with an output valued at £2½ million. The acreage has changed very little since the last Examination.

39. The largest areas of production are still in those parts of the East Anglian fens and Lancashire where the high organic content of the soil is particularly well suited to the growing of celery. Self-blanching varieties are, however, less specialized in their requirements, and on favourable geographical sites will grow on almost any light soil. Although the bulk of the celery crop is grown on holdings devoting a quite substantial acreage to it—7 per cent of the celery-growers have nearly two-thirds of the total acreage—many growers produce small quantities of self-blanching celery particularly for marketing during the first few weeks of the season. At this time demand is keen, and there may well be scope for the smaller producer to increase his acreage of early self-blanching celery. There may

also be some more limited scope for the small intensive producer to grow out of season celery under glass; this form of production may, however, present difficulties both in fitting celery into the glasshouse rotation, and in the fact that the low intensity and short duration of light during the winter months inhibits growth.

40. During the last four or five years, many growers have been planting celery at a much greater density per acre than in the past, and some holdings are also worked to a very close rotation. These more intensive methods naturally increase production costs. They have not, however, always led to the correspondingly higher output which might have been hoped for, since there have been increased crop losses through disease. The two main diseases which are a problem associated with closer spacing of celery are leaf spot and *centrospora accrura*. Although soaking of seed in thiram has been found to be effective against leaf spot, some infection can occur in growing crops from infected debris left in the ground from the previous year. Research is being carried out into the problem of *centrospora* disease which appears only in stored celery.

41. In America, large scale production makes it possible to mechanize some operations such as topping, and one or two of the larger growers in this country are now mechanizing.

Demand and marketing

42. The demand for fresh celery has hitherto been met almost entirely from home production and the market prefers the English white celery to the green varieties which are most extensively grown in America. There was, however, an import of 4,200 tons—6 per cent of the total supply—in 1969, mainly from the U.S. and Israel; and the increasing use of air transport for perishable foodstuffs may lead to greater competition from imports.

43. Although celery will stand well in open weather, the grower who holds it over for later-season marketing risks the loss, or at any rate the serious deterioration, of his crop if there are heavy frosts. Close-rowed self-blanching celery is more susceptible to frost than the wide-row celery which is earthed-up and marketed later. Cold storage is practised to some extent, but at present is not technically feasible for periods of longer than six weeks, and there are problems about providing the right degree of humidity to keep the celery in good condition. Celery marketed straight from the open ground is in any case superior in quality to cold-stored celery and, in a relatively mild winter, celery that has been put into cold store fairly early in the season may reach the limits of its marketable life while the more attractive open-ground crop is still available.

44. Increasing quantities of celery are being taken by canners, often on the basis of annual contracts with growers. The growers do not always find it possible to fulfil their contracts, however, when early frosts occur before harvesting is finished.

TABLE 16
Celery
U.K. production

Year	Home Grown (Agricultural Holdings only)					
	Cropped area	Gross yield	Output	Growers' farm gate price	Value	Value per acre
	acres	tons/acre	'000 tons	£/ton	£'000	£
1956/57. . . .	5,201	14.5	71.7	12.61	904	174
1957/58. . . .	5,073	14.3	71.4	18.19	1,299	256
1958/59. . . .	6,108	17.4	103.7	14.16	1,468	240
1959/60. . . .	6,084	13.5	80.6	17.48	1,409	232
1960/61. . . .	6,327	17.6	110.5	19.25	2,126	336
1961/62. . . .	6,345	14.9	93.2	22.61	2,107	332
1962/63. . . .	6,226	14.2	87.5	19.03	1,665	267
1963/64. . . .	5,739	19.5	108.7	19.25	2,093	365
1964/65. . . .	5,583	14.0	71.0	22.45	1,594	286
1965/66. . . .	5,439	13.9	65.4	20.18	1,320	243
1966/67. . . .	5,402	16.8	79.9	25.37	2,027	375
1967/68. . . .	5,431	17.9	79.0	27.33	2,159	398
1968/69. . . .	5,366	16.1	64.3	32.67	2,101	392
1969/70. . . .	5,329	14.8	62.9	41.32	2,599	488

Imports not separately distinguished for the years shown until 1969 when 4.2 thousand tons were received at a value of £458,000.

RHUBARB

Production

45. The estimated acreage of rhubarb, including that forced in sheds, which stood at 4,083 acres (cropped area) at the time of the last Examination, had fallen to 3,541 acres (cropped area) in 1969/70; output from the latter was valued at rather over £1½ million. The Scottish cropped acreage has increased from 543 to 554 acres over the same period.

46. In any one year several hundred acres of rhubarb crowns growing outdoors are lifted and transferred to sheds for forcing; most forced rhubarb is grown in the West Riding of Yorkshire. The crowns must be at least two or three years old before they are brought into the forcing sheds when they start to crop after 3-4 weeks. The crown's life is ended after a single season's forcing, and it is possible to fill the sheds with two batches of crowns a year. As it takes one acre of outdoor rhubarb at a density of 6,000 crowns per acre to fill one 450 sq. yard shed, and as the crop will have been occupying the land for at least two years before being brought inside, the production of forced rhubarb demands a considerable supporting acreage of outdoor plants. The outdoor plantings are usually worked on a rotation, often with cauliflowers, in order to rest the land and keep it free from disease.

47. The outdoor crop is more widely distributed geographically, and once established is left down. It is grown for canning as well as the fresh market.

48. The chief problems in the growing of rhubarb lie in the labour-intensive nature of the crop and its susceptibility to virus diseases. Research into the production of virus-free stocks is being carried out at the National Vegetable Research Station and the method of multiplication of these stocks is being investigated at Stockbridge Experimental Husbandry Farm. No lifting machine is yet available commercially.

Demand

49. Rhubarb is in season from January until July: as a forced crop during the first three months of the year, and as an outdoor crop from April onwards. Although prices are at their highest in January and decline steadily until the end of the season, domestic purchases are at their maximum in April and May, when cooking apples are in shorter supply. The increase in the use of cold storage for apples, and the consequent extension of the season for cooking apples, has considerably reduced the demand for rhubarb.

TABLE 17
Rhubarb (including forced rhubarb)
U.K. production

Year	Home Grown (Agricultural Holdings only)					
	Cropped area	Gross yield	Output	Growers' farm gate price	Value	Value per acre
	acres	tons/acre	'000 tons	£/ton	£'000	£
1956/57 . . .	5,853	5.1	26.5	33.47	887	152
1957/58 . . .	5,620	7.0	37.0	40.41	1,495	266
1958/59 . . .	5,701	6.4	35.6	33.45	1,191	209
1959/60 . . .	5,791	6.8	37.9	40.82	1,547	267
1960/61 . . .	5,787	6.2	35.6	32.89	1,171	202
1961/62 . . .	5,719	6.6	36.8	40.71	1,498	262
1962/63 . . .	5,676	8.2	44.0	33.64	1,480	261
1963/64 . . .	5,218	8.9	45.1	34.26	1,545	296
1964/65 . . .	5,428	9.7	47.4	27.76	1,316	237
1965/66 . . .	5,271	9.9	50.5	26.40	1,333	253
1966/67* . . .	4,083	12.1	48.6	32.65	1,587	389
1967/68 . . .	3,606	12.7	44.8	35.71	1,600	444
1968/69 . . .	3,751	12.4	45.4	43.26	1,964	521
1969/70 . . .	3,541	11.9	41.4	40.19	1,664	470

* In 1966, the question on rhubarb was transferred from the June to the September census, and a separate question on rhubarb for forcing was included for the first time. Before 1966 the acreage of rhubarb for forcing was estimated.

Imports not separately distinguished.

ASPARAGUS

Production

50. The asparagus acreage fell by 15 per cent between 1966/67 and 1969/70 continuing the previous downward trend. The total estimated cropped area in the UK amounted to just under 1,000 acres in 1969/70, and output was valued at £365,000.

51. The two main centres of production are Suffolk and Norfolk in East Anglia and Worcestershire in the West Midlands. There is a marked contrast in the types of production in the two areas. In East Anglia asparagus is grown on large holdings (two growers alone had 247 acres between them in December 1969). In the West Midlands, although the small family holding is tending to disappear, production is still concentrated in small more intensively cultivated units which average less than 3 acres per holding and produce a higher yielding crop. As the asparagus acreage has fallen the tendency has been to confine it to the lighter soils. In East Anglia, indeed, it is grown on soils that are too light to be profitable for other crops.

52. The crop yields no return for the first two years after planting, or three years if it is raised from seed. A light cutting can be taken in the third year after planting, or the fourth after sowing, and the crop will usually have reached its maximum growth after one more year. It will then, subject to freedom from disease, continue to provide a harvest apparently without any regular supply of fertilizers, for experiments at both Wisley and Luddington Experimental Husbandry Station have shown no significant difference in yield between crops grown with and without applied nutrients.

53. The cost of harvesting and preparing the crop for market is high. It is estimated at £157 per ton, 26 per cent of the current average farm gate price. The season lasts for only 6-8 weeks during the early summer, a short period as most vegetable crops go. Asparagus can grow by 2 inches a day under normal conditions, as much as 6 inches on occasion. Ideally the beds should be gone over daily. Harvesting usually starts in April and continues as fast as growth factors allow until late June each year. After cutting, the crop is traditionally graded and bundled, and packed with some care: all relatively high-cost operations.

54. A number of cutting machines have been tried out, with the object of reducing harvesting costs, but no very satisfactory machine has yet been designed which is suitable for English methods of growing. In the U.S.A. two types of cutting machine have been developed. One cuts selectively, but as it can be used only on flat beds it is unsuitable for English production which is mainly on ridges. The other type of machine, though designed for use on ridges, cuts everything below ground level. In consequence, the wastage rate is high and under our climatic conditions the plant does not recover sufficiently quickly to enable several cuts to be made in the season.

Demand and marketing

55. The larger part of the East Anglian crop is sold on commission in the London markets, as a fresh vegetable, whereas in Worcestershire a large part has been sold to processors under contract. Canned asparagus is expected to be of high quality, and canners use only 4½ inches or so of the asparagus stem and tip, the ends of the sticks being used for flavouring soups.

56. The localization of the main producing areas, coupled with the increasing costs of transport and the withdrawal of rail services in East Anglia and elsewhere, has led to the present concentration on London markets

although there is an unsatisfied demand in other parts of the country. Growers have hesitated to undertake the expense of looking for and supplying markets farther afield, and see little prospect of reversing the downward production trend unless some reduction in production and marketing costs becomes possible—e.g., by the development of mechanical harvesting devices, or by encouraging the public to buy loose rather than bundled asparagus.

TABLE 18
Asparagus
U.K. production

Year	Home Grown (Agricultural Holdings only)					
	Cropped area	Gross yield	Output	Growers' farm gate price	Value	Value per acre
	acres	tons/acre	'000 tons	£/ton	£'000	£
1956/57 . . .	1,404	0·8	1·2	177·14	207	147
1957/58 . . .	1,507	0·8	1·1	173·18	190	126
1958/59 . . .	1,377	0·9	1·3	261·11	339	246
1959/60 . . .	1,378	0·9	1·2	348·33	418	303
1960/61 . . .	1,482	1·0	1·5	282·45	424	286
1961/62 . . .	1,532	0·9	1·4	303·03	424	277
1962/63 . . .	1,541	0·6	1·0	269·00	269	175
1963/64 . . .	1,498	0·6	0·9	306·67	276	184
1964/65 . . .	1,473	0·7	1·0	360·00	360	244
1965/66 . . .	1,106	0·9	1·0	395·00	395	357
1966/67 . . .	1,174	0·9	1·0	427·00	427	364
1967/68 . . .	1,167	0·6	0·7	565·72	396	339
1968/69 . . .	1,066	0·8	0·8	548·75	439	412
1969/70 . . .	996	0·6	0·6	608·33	365	366

Since 1963 Imports not separately distinguished. During the years 1956 to 1962 imports averaged between 100 and 200 tons per annum with an average value of about £60,000.

WATERCRESS

Acreage and value

57. Although there were only 470 acres (estimated cropped area) of watercress in 1969/70, the value of the output amounted to £0·9m. The acreage is some 5 per cent lower than in 1966/67, and reflects the continuing downward trend. To some extent this may be due to increasing water demands by industrialists and local authorities, leading to a fall in the water table in some areas.

Marketing

58. Watercress is one of the few horticultural crops that are sometimes sold at a firm forward price on the fresh market. There are no separate statistics for the consumption of watercress, but demand appears to be declining with the greater choice of other salad crops now offered to the consumer, often in attractive convenience-packs. Watercress is usually sold in bunches. Experiments in pre-packaging in polythene, with the object of attracting the supermarket trade, have met with limited success.

59. It is a highly perishable crop whose sales depend on its reaching the market early in the day. Its production demands an abundant supply of fresh spring water and occurs for the most part in the chalk belt, often on sites which are not readily accessible to main population centres or near to other types of horticultural holding. Growers are meeting with increasing difficulty in supplying more distant markets, as a result of the closure of railway stations, changes in train schedules, and the not infrequent failure of scheduled rail services to keep to their timetables. One Dorset grower, for instance, who has been sending watercress to Leeds, Halifax, Bradford and Huddersfield for a number of years, has found that changes in the railway timetable now make it impossible for his produce to reach these markets in time. In Hampshire, several growers have combined to organize their own transport, but in other areas watercress holdings are too scattered for the pooling of transport, either with each other or with other horticulturists, to be an easy matter.

60. As for most other horticultural crops, demand is stronger towards the weekend than at the beginning and middle of the week. Hydro-cooling, in conjunction with the use of the cold room, makes it possible to keep watercress for three days without apparent deterioration and has enabled many growers to supply the demand while maintaining an even rate of picking throughout the week. It is said that 50 per cent. of the crop is hydro-cooled. The use of a cold room alone, without hydro-cooling, is less effective since air cooling causes dehydration and a humidified cold room reduces the crop temperature at too slow a rate. Ideally, the crop should be kept at a controlled temperature right through the chain of distribution until it reaches the consumer, but few if any watercress growers would find it economic to provide their own controlled-temperature transport and—as already noted—they are not usually situated in areas where it is practicable to join with the growers of other horticultural produce to provide such transport.

Mechanization

61. Watercress is not a crop which lends itself to mechanization, although neither cultivating nor picking the crop is a popular form of labour. As the crop matures unevenly, harvesting must be selective, and a succession of harvests are taken from the same stock. In the summer, harvesting can sometimes be carried out at three weekly intervals, although a five-six weekly interval is more usual. No successful cutting machine has yet been designed. It has been suggested, however, that growers should be thinking in terms of organizing their production in narrower beds than are customary at present, so that the beds could be straddled either by a simple type of machine designed only to cut the crop or by a more elaborate one, if this could be devised, capable of both cutting and sorting.

62. The mechanization of fertilizer spraying and seed sowing poses fewer technical difficulties than that of harvesting, and would save much of the labour that now goes into watercress growing. There has, however, been little interest in designing suitable machines, since the demand would be too limited to interest most manufacturers. It is noteworthy in this connection that the hydro-cooling and packing machines which the Group saw on one

watercress holding had been built by the grower himself and incorporated timing mechanisms for the different operations designed by the grower.

Research and development

63. With a crop of minor national commercial importance, compared with many other horticultural crops, research effort is necessarily limited, and there is much yet to be learned about how watercress reacts to different conditions, its nutritional requirements (especially with regard to trace elements), the influence of light on its growth etc. The M.A.F.F. watercress unit at Alresford is carrying out experiments on water-flows, re-use of water, winter protection and nutrition, and meteorological records are being kept. A certain amount of cross-breeding has been done by growers over the last ten years with the object of producing a better quality crop, and it is felt that emphasis should be placed on the year-round improvement of quality, in order to keep the product continuously before consumers, rather than on increasing spring and autumn yields. Any serious development towards mechanized harvesting would demand the parallel development of strains of watercress suitable for this type of cutting.

64. A few growers have carried out their own experiments in protected cropping. The use of polythene coverings produces a thinner crop, giving possibly as little as half the yield which an open-grown crop could produce. This may be the result of the reduction of light aggravated by condensation under polythene. It has, however, enabled growers to maintain continuity of production during the winter months and to produce a very high quality product free from roots, which attracts a high price from supermarkets.

TABLE 19
Watercress
U.K. production

Year	Home Grown (Agricultural Holdings only)					
	Cropped area	Gross yield	Output	Growers' farm gate price	Value	Value per acre
	acres	tons/acre	'000 tons	£/ton	£'000	£
1956/57 . .	665	11.9	7.9	127.28	993	1,493
1957/58 . .	660	11.1	7.3	117.28	856	1,270
1958/59 . .	654	11.4	7.5	109.48	822	1,255
1959/60 . .	636	10.8	6.9	113.50	783	1,231
1960/61 . .	619	11.3	7.0	118.06	826	1,334
1961/62 . .	601	7.4	4.4	116.61	513	854
1962/63 . .	593	9.6	5.6	146.25	819	1,381
1963/64 . .	584	10.6	6.1	133.28	813	1,392
1964/65 . .	552	10.3	5.7	150.53	858	1,554
1965/66 . .	557	13.6	7.5	152.00	1,140	2,047
1966/67 . .	493	13.1	6.5	145.85	948	1,923
1967/68 . .	492	13.2	6.5	144.92	942	1,915
1968/69 . .	474	13.7	6.4	157.34	1,007	2,124
1969/70 . .	470	13.2	6.0	150.17	901	1,917

Imports not separately distinguished.

Production

65. The development of chemical methods of weed, pest and disease control, and of varieties with many impressed characteristics, have brought obvious benefits to the specialist growers from whom most vegetables for human consumption have traditionally come; but these developments, and progress in mechanization, have also made vegetable growing more attractive to the farmer who is looking for a break-crop in his arable rotations. This has led to over-production, particularly of coarse vegetables.

66. It seems probable that, under these competitive pressures and with the increasing use of light and relatively inexpensive plastic structures, the specialist growers of field vegetables may themselves turn increasingly to the production of the more tender and out of season crops, and that—whether or not as a consequence of such a move—the growing popularity of polythene tunnels may in time lead to increased production of the more demanding crops. It may be that the greatest scope for expansion in the use of polythene as a cover for crops is on the small crop-intensive holdings. As techniques improve and improved forms of plastic become available they are likely to be used increasingly to serve a variety of purposes: e.g., the protection of winter watercress from frost, the production of clean celery, to catch the early market for such crops as young carrots and runner beans, or to raise young plants for growing on out of doors.

67. Mechanization has made limited progress in either the cultivation or the harvesting of those crops—e.g., celery, rhubarb, asparagus, watercress—whose total production amounts to only a few thousand acres or less, for few manufacturers would regard it as worth their while to design and produce specialized machines for so small a market. With the field vegetables, many of the cultivation processes can now be mechanized, and scope for further mechanization lies mainly in harvesting, although there is, of course, scope for improved mechanization in many fields. The development of mechanical harvesters does not in itself present very great difficulties. The difficulty lies in the development of a system of growing providing for evenly maturing crops which will allow mechanical harvesters to be used without high wastage.

Storage

68. The importance of cool or cold storage, and the difficulty of achieving this at economic cost without destroying the crop's freshness and crispness, are matters of concern to the growers of most vegetable crops. Leafy vegetables in particular are liable to short-term gluts and shortages whose effect might be evened out with more widespread use of temperature-controlled storage; many crops must be harvested within a short time of reaching maturity, whatever the current state of the market; self-blanching celery in particular should be got off the ground before heavy frosts set in; salad crops in general are particularly perishable. The main technical problem is to combine effective cooling with an adequate degree of humidity. The cost of

installing and operating cooling equipment and cold stores is at least as important a factor as the technical problems; and for the full benefit to be derived from cooling at the grower's end, a controlled environment should, ideally, be available throughout the distribution system.

Marketing

69. Only a small proportion of the total vegetable production is sold through supermarkets and multiple stores. Especially in large towns and cities, such stores tend to concentrate on produce which gives a high return per unit area of space and to leave sales of the bulkier vegetables to small independent retailers. It is reported that in the United States of America the fresh fruit and vegetable sections of many supermarkets have proved unprofitable, and have been let off to private traders who are prepared to devote more time and care to handling of perishable produce.

70. Roadside sales are an increasingly popular outlet, especially for the small grower. Vegetables also are sold through some garden centres run in conjunction with nursery gardens. These can be profitable methods of selling, giving fresh produce to the customer and a full share of the retail price to the grower-cum-salesman, but they entail very long working hours, and some growers may not persist with this form of marketing longer than two or three years.

71. Both the housewife and the caterer demand foods which are easy to prepare, and there is great emphasis on well-cleaned, picked and graded produce. Some effort has been devoted to explore the possibilities of pre-packaging, especially for the higher cost vegetables. The high moisture content of most vegetables, and the rapid transpiration where leafy vegetables are concerned, leads to condensation where polythene packs are used, and makes this form of packaging less attractive for vegetables than it is for other horticultural crops. Nets, tray packs and plastic shrink-wrap are, however, successfully used to pre-pack appropriate produce, e.g., brassicas, onions, cress.

72. Canned frozen or dehydrated produce is the 'convenience pack' in perhaps its most convenient form, if not always its best flavoured one. It is particularly significant that household consumption *per caput* of all processed vegetables increased by no less than 80 per cent between 1958/60 and 1969, compared with an actual decrease of 7 per cent *per caput* in fresh green vegetables and a rise of only 9 per cent in other fresh vegetables (excluding potatoes). The processing market is an exacting one, demanding crops grown to a stringent specification: a task which demands much expertise and adaptability from growers. The processor is in a strong bargaining position unless growers are prepared to combine in a joint selling organization. Failure to meet the required specification can lead to a sudden and unforeseen glut on the wholesale market, which is usually the only outlet for produce rejected for processing. An incidental benefit of sales for processing is, however, that vegetables sold in this way share in the extensive publicity which most processors, and few growers, are prepared to give to their products.

73. Transport difficulties have already been referred to in connection with several of the crops studied. They are not of course peculiar to vegetable growers but they are necessarily a matter of considerable concern to an industry whose various centres of production have grown up in specialized localities selected with particular regard to their soil and climate, and at a time when rail transport was cheap and convenient. With the reorganization of the railway system, many of these areas have ceased to be within convenient reach of their old markets, and there is a tendency, particularly with the more specialist crops, for the bigger market to be over-supplied at times when there is an unsatisfied demand at smaller and less accessible markets.

Record of Study by the Glasshouse Group

1. We have made a special study of tomatoes, cucumbers and lettuce. All these crops were studied in some detail in the course of the 1967 examination. The total estimated value at farm gate prices of the output of tomatoes, cucumbers and lettuce in the U.K. in 1969/70 was nearly £22½ million compared with just under £17 million in 1966/67. In 1969/70 this figure represented 94 per cent of the total value of all glasshouse fruit and vegetable output, exactly the same proportion as in 1966/67. Of the 1969/70 total, tomatoes were worth about £14½ million, £3 million more than in 1966/67, cucumbers £4 million and lettuce £4 million.

TOMATOES

2. The estimated cropped area of tomatoes in the U.K. in 1969/70 was 2,305 acres compared with 2,238 acres in 1966/67. Although the acreage showed little change there was a considerable increase in yield, and output rose to 91,300 tons in 1969/70, from 79,700 tons in 1966/67. There was considerable regional concentration in the acreage, one-third of the total heated crop being in the Eastern Region and about one-quarter of the unheated crop in Yorks/Lancs and rather more than one-quarter in the Eastern region.

Production and supply

3. The situation forecast in the 1967 Examination has not altered significantly; the home season has lengthened as a result of some extension of home production in the early part of the year, and the trend for expansion in the unheated crop is still upwards. There has been a steady improvement in yield, as a result of the application of new techniques, better glass and equipment, and the use of blue-print recommendations

worked out by the NAAS. CO₂ enrichment has contributed to the production of the early crop, but is not applicable to tomatoes sown after December. Plastic tunnels are increasingly used by producers who are mainly concerned with lettuce and vegetable plant production but who find they can use tomatoes as a summer crop.

4. The main imports still come from the Netherlands during the home season and from Spain and the Canary Islands at other times but the quantities they supplied in 1969 have fallen by about 9,000 tons compared with 1965. Over the same period there have been marked increases in imports from the Irish Republic, Rumania, France and Morocco, although these four countries still account for only 2.7 per cent of total imports. Total imports in 1969 were 5,600 tons lower than in 1965, whereas Channel Island shipments rose by rather over 4,700 tons, a net decline of almost 1,000 tons compared with an increased U.K. output of nearly 13,000 tons, indicating that home producers have captured the entire increase in the consumption of tomatoes. A general conclusion drawn from the annual figures of imports does not, however, take account of when supplies came into the market or of the extent to which returns on the valuable early market for home produce can be affected by unexpected and increasing sources of foreign consignments.

Marketing

5. Tomatoes are available throughout the year, the market being supplied between November and March by imports, mainly from Spain and the Canaries. Home and Channel Island production at the beginning of the home season of March to November has increased since the last Examination but has decreased in the summer months.

Grading

6. Statutory grades for cucumbers were introduced into the U.K. in January 1968 and grades for tomatoes came into operation in May 1968. The object of statutory grading is to help home growers to compete more effectively against well graded high quality imports in a market which increasingly demands good quality and uniform produce, and to help speed distribution by the use of recognized standards of quality. The grading regulations were drawn up after full consultation with trade interests and they now form an established part of the marketing process. It is, however, sometimes alleged by growers that, because grading is not carried through to the retail level, they do not get an adequate premium for their top quality produce. Since, however, it is at the wholesale level that the retailer exercises his choice as between home grown and imported produce, it is at this stage that grading needs to be effective and from which growers stand most to benefit. The extension of grading to retail sales is not thought to be justified at present.

TABLE 20

Tomatoes

U.K. production and imports

Year	Home Grown (Agricultural Holdings only)						Net Imports*		Channel Islands		Total Supplies by Weight
	Cropped area	Gross yield	Output	Growers' farm gate price	Value	Value per acre	Total quantity	Total value	Total quantity	Total value	Home grown
							'000 tons	£'000	'000 tons	£'000	per cent.
1956/57	3,863	25.3	97.3	£/tons	£'000	£	119.9	13,118	62.6	9,867	35
1957/58	3,436	30.0	101.2	130.23	12,671	3,280	132.1	13,293	71.2	10,527	33
1958/59	3,240	28.5	90.4	125.09	12,659	3,684	139.3	14,789	62.3	9,652	31
1959/60	3,005	34.1	100.9	129.50	11,707	3,613	144.6	15,669	75.4	9,685	31
1960/61	2,812	32.5	89.7	103.76	10,467	3,483	157.1	16,633	68.3	9,541	28
1961/62	2,663	33.2	87.5	120.79	10,835	3,853	157.6	18,220	73.5	9,850	27
1962/63	2,499	33.3	81.6	129.85	11,362	4,267	152.2	18,263	67.1	10,167	27
1963/64	2,423	31.7	75.6	135.13	11,027	4,413	162.4	20,567	51.5	9,181	26
1964/65	2,391	34.6	82.1	154.55	11,684	4,822	165.7	23,038	59.3	9,151	27
1965/66	2,246	35.5	78.5	140.88	11,566	4,837	163.6	21,097	63.2	12,196	26
1966/67	2,238	36.0	79.7	148.03	11,620	5,174	154.8	21,881	68.2	12,300	26
1967/68	2,227	38.1	83.8	145.11	11,565	5,168	155.7	21,134	70.7	10,578	27
1968/69	2,226	37.1	81.1	144.69	12,125	5,445	167.4	24,219	64.6	11,350	26
1969/70	2,305	40.2	91.3	169.01	13,707	6,158	158.1	24,426	68.0	11,984	29
				158.43	14,465	6,275					

* Imports relate to the first calendar year indicated.

TABLE 21

*Tomato imports to the United Kingdom in 1965 and 1969**(Gross)*

Consigning Country	1965		1969	
	Tons	£'000	Tons	£'000
Canary Islands	81,542	9,080.3	74,935	10,501.9
Netherlands	52,318	8,923.3	46,864	9,400.7
Spain	28,781	3,083.2	32,010	4,520.8
Irish Republic	974	152.5	2,415	438.6
Rumania	46	5.9	1,292	209.4
France	109	12.4	265	50.1
Belgium	59	10.5	101	10.4
U.A.R. (Egypt)	44	3.3	—	—
West Germany	13	1.6	—	—
Cyprus	8	1.5	32	5.8
Malta	8	4.0	30	19.9
Italy	6	0.9	29	3.6
Bulgaria	6	0.8	13	1.4
U.S.A.	4	0.7	2	0.9
Israel	4	1.5	21	3.8
Morocco	1	0.08	302	31.3
Congo-Kinshasa	—	—	6	0.9
Totals	163,923	21,282.5	158,317	25,199.5
Channel Islands	63,249	12,196.1	67,976	11,983.8
Totals	227,172	33,478.6	226,293	37,183.3

N.B. Some very small imports have been omitted.

CUCUMBERS

7. The estimated cropped area of cucumbers in the U.K. in 1969/70 was 368 acres compared with 401 acres in 1966/67. There has been a slight increase in output, the figures being 29,800 tons in 1969/70, and 29,600 tons in 1966/67. The largest area of concentration is in the Lea Valley, where 12 holdings contributed nearly 30 per cent of the crop area and where there were fewer small growers than in other parts of the country. The recent expansion of cucumber growing in Yorkshire is associated with the operations of one very large-scale business.

Production

8. The U.K. output and share of the market have both been falling over the past decade and in 1969/70 the U.K. accounted for 54 per cent of total supplies compared with 94 per cent in 1959/60. During this period annual imports have increased greatly and in 1969 totalled 25,000 tons compared with under 2,500 tons in 1959. Over the three years 1967, 1968 and 1969, however, imports have remained at almost the same level. The estimated total value of the home-grown crop in 1969/70 was £3,968,000 at farm gate prices compared with £3,330,000 in 1966/67.

9. The development of new techniques has gone as far towards improving productivity of tomatoes and cucumbers as can be expected at present, and there are not likely to be further great improvements in yields of any of the major food crops grown under glass. Cucumbers need considerable care, know-how and attention to detail, and labour costs, particularly for early cucumber production, are expected to remain high. The industry's chief means of offsetting or combating rising costs must therefore be by making improvements in marketing wherever possible. The size of this task may be gauged by the fact that, although the yield has increased over the last 14 years (i.e., from 75 tons per acre in 1956/57 to 81.6 tons per acre in 1969/70, an increase of nearly 9 per cent), the return per acre has fallen, whilst the minimum hourly rate as laid down by the Agricultural Wages Board rose from 2s. 11d. in 1956 to 5s. 8d. in 1969, a rise of 94 per cent. Fuel oil prices have also risen sharply since the last Examination. These two items, fuel and labour, account for over 50 per cent of production costs.

10. The traditional system of growing cucumbers continuously from early in the year is beginning to give way to the treatment of cucumbers as part of a rotation. This means later production and a smaller yield; but it allows cucumbers to be fitted in with a lettuce crop and does not demand such high input costs as the traditional system.

Imports

11. Home production normally has to compete with large quantities of Dutch cucumbers in the early season at a time when the home produced crop attracts good prices. This can cause difficulties for growers, especially when, as happened in 1970, imports of cucumbers from Eastern Europe were concentrated in a short period and there was temporary over-supply.

LETTUCE

12. The estimated cropped area of lettuce grown under glass in the U.K. in 1969/70 was 1,986 acres (including an estimated 530 acres under frames) compared with 1,649 acres (450 acres under frames) in 1966/67. Output was estimated at 15,300 tons in 1969/70 (4,300 tons under frames), compared with 12,400 tons in 1966/67 (3,400 tons under frames), and the value of the whole of the protected crop at these two dates was £3,944,000 and £2,071,000 respectively. Adverse growing conditions in the spring of 1969 caused a temporary slowing down of supplies of lettuce cold and in frames resulting in higher prices. There was considerable geographical concentration in the industry, the main areas of production being Lancashire and Yorkshire (E.R.), W. Sussex, Essex, Worcester and Bedford. About 43 per cent of the total crop is grown in unheated glass, 31 per cent in heated glass and 26 per cent under frames.

Production

13. Of the 2,900 tons increase in output in the U.K. between 1966/67 and 1969/70, 1,000 tons has come from the heated sector, 1,000 tons from the cold sector and 900 tons from frames. This appears to be in response to the increasing year round demand for lettuce, particularly for use in winter salads with the tomatoes and cucumbers that are now readily available at that time of year. The industry has been assisted in this by

TABLE 22

Cucumbers

U.K. production and imports

Year	Home Grown (Agricultural Holdings only)						Net Imports*		Channel Islands		Total Supplies by Weight
	Cropped area	Gross yield	Output	Growers' farm gate price	Value	Value per acre	Total quantity	Total value	Total quantity	Total value	
	acres	tons/acre	'000 tons	£/tons	£'000	£	'000 tons	£'000	'000 tons	£'000	per cent.
1956/57	422	75.0	31.7	144.35	4,576	10,844	1.7	265	...	...	95
1957/58	451	76.4	34.5	139.13	4,800	10,643	1.1	200	...	...	97
1958/59	457	71.5	32.7	135.47	4,430	9,694	1.4	246	...	...	96
1959/60	475	77.0	35.9	125.29	4,498	9,469	2.3	416	...	...	94
1960/61	486	69.1	33.0	121.94	4,024	8,280	4.1	740	...	...	89
1961/62	447	72.5	32.3	138.05	4,459	9,975	7.1	1,245	...	...	82
1962/63	456	70.1	32.0	111.59	3,571	7,831	8.6	1,427	...	1	79
1963/64	422	75.3	31.7	122.18	3,873	9,178	14.8	2,120	...	1	68
1964/65	430	70.7	30.3	120.00	3,636	8,456	19.2	2,764	...	...	61
1965/66	421	78.7	33.0	120.42	3,974	9,439	20.3	2,937	...	3	62
1966/67	401	75.0	29.6	112.50	3,330	8,304	22.8	3,154	...	7	56
1967/68	358	86.7	30.8	123.05	3,790	10,587	25.4	3,398	...	...	55
1968/69	362	80.7	29.0	130.34	3,780	10,442	25.4	3,798	...	...	53
1969/70	368	81.6	29.8	133.15	3,968	10,783	25.0	3,982	...	1	54

*Imports relate to the first calendar year indicated.

... Less than 50 tons or less than £500.

the development of new lettuce varieties suitable for winter production in heated houses. There is, however, an unsatisfied demand for a crisp winter lettuce and, although work is being carried out at the Glasshouse Crops Research Institute on the breeding of crisp or cos types for production under glass, it is as yet too early to assess the commercial benefits of this programme.

14. Many growers now grow lettuce in rotation with tomatoes. The crop is increasingly regarded as a major one in its own right, and much less as a catch crop, and growers who go in for it tend to continue to cultivate it year after year. To some extent the lower returns for early cucumbers have caused some growers to switch to lettuce production, particularly in the Lea Valley where the benefits of the Clean Air Act are also being felt. Production in Scotland has increased partly because of the increased interest of Scottish growers in tomato growing and the consequent use of lettuce as a rotational crop. Scottish growers find it profitable to plant in April rather than in January to save heating costs.

15. Techniques in lettuce production are still developing and have not yet reached the temporary plateau which seems to have been achieved in the techniques of tomato and cucumber production. Two new early maturing varieties (Emerald and Sea Queen), which can be grown with moderate heat or cold, are considered to be somewhat better than some Dutch varieties. The Dutch themselves are breeding varieties of lettuce which can be grown under glass or other forms of protection in the hotter months of the year in response to the public demand for a cleaner, well presented product. Production methods continue to benefit from such inexpensive improvements as the increased use of pelleted seed and peat blocks, and from the greater use by larger enterprises of planting machines and stream-lined production techniques.

Film plastic structures

16. These are in fairly general use in those parts of the Continent where the climate is particularly suitable and are attracting much interest in the U.K. They are far less expensive than glasshouses, and can be fitted with simple heating, irrigation and ventilation equipment, which make them very suitable for the production of crops such as lettuce. There is a movement towards the increased use of plastic covers for the planting of early lettuce for marketing in March and an extension of the use of plastic covers could well help to fill the shortage in production in late April and early May. The industry may well experiment with the use of these structures and it is possible that the grower who at present concentrates on outdoor lettuce will be attracted to this system of production in order to extend his season. On the other hand, this form of protected cropping demands higher labour requirements and specialized techniques to which the cold glasshouse producer is more accustomed, and the development of this type of production may therefore lie with established glasshouse growers.

Imports

17. The home marketing season for glasshouse lettuce extends from October to May. Almost all imported lettuce also comes into this country

during this period and it is notable that increased home production has successfully held down imports.

Imports from October 1966 to May 1967 totalled 11,500 tons excluding the Channel Islands, and from October 1969 to May 1970 were 10,600 tons. During the first period there was a distinct peak in March 1967, whereas in the latter period there were almost equal arrivals in January and April 1970. U.K. imports are dominated by the Netherlands who in 1969 provided 9,600 tons. Israel sent 550 tons, Spain 360 tons and France 250 tons. Shipments from the Channel Islands (partly in June) amounted to 760 tons.

TABLE 23

Lettuce (heated)

U.K. production and imports

Year	Home Grown (Agricultural Holdings only)						Net Imports*	
	Cropped area	Gross yield	Output	Growers' farm gate price	Value	Value per acre	Total quantity	Total value
	acres	tons/acre	'000 tons	£/ton	£'000	£	'000 tons	£'000
1956/57	455	6.4	2.9	N.S.D.	N.S.D.	N.S.D.	5.2	961
1957/58	412	6.6	2.7	167.78	453	1,100	9.0	1,432
1958/59	378	7.4	2.8	165.00	462	1,222	8.1	1,505
1959/60	355	6.8	2.4	181.67	436	1,228	10.1	1,883
1960/61	321	4.7	1.5	222.67	334	1,040	11.5	2,169
1961/62	327	8.0	2.5	327.20	818	2,502	13.3	2,465
1962/63	501	5.4	2.7	450.00	1,215	2,425	8.6	2,319
1963/64	477	6.7	3.1	243.55	755	1,583	8.6	2,247
1964/65	451	6.7	2.9	215.17	624	1,384	11.1	2,843
1965/66	507	6.3	3.0	201.33	604	1,191	11.7	2,679
1966/67	499	7.6	3.7	176.22	652	1,307	10.6	2,765
1967/68	515	7.4	3.7	240.54	890	1,728	12.3	2,635
1968/69	585	7.0	4.0	270.50	1,082	1,850	9.6	2,988
1969/70	686	7.1	4.7	270.64	1,272	1,854	11.1	3,234

* Imports relate to the first calendar year indicated. Channel Island supplies are excluded. It is not possible to determine precisely whether or not imported lettuce is grown under glass, either heated or unheated, or in the open. However, as the imports arrive mainly during the months of November to April these may be regarded as supplementing supplies of home grown heated lettuce.

N.S.D. Not separately distinguished.

TABLE 24

Lettuce (cold)

U.K. production and imports

Year	Home Grown (Agricultural Holdings only)						Channel Islands*	
	Cropped area	Gross yield	Output	Growers' farm gate price	Value	Value per acre	Total quantity	Total value
	acres	tons/acre	'000 tons	£/tons	£'000	£	'000 tons	£'000
1956/57	440	8.1	3.5	N.S.D.	N.S.D.	N.S.D.	0.5	65
1957/58	443	8.0	3.5	139.16	484	1,093	0.4	43
1958/59	465	7.4	3.1	135.58	416	895	0.3	33
1959/60	515	7.3	3.7	156.26	578	1,133	0.4	42
1960/61	571	8.1	4.5	159.98	720	1,272	0.2	42
1961/62	542	8.7	4.7	244.46	1,149	2,120	0.2	34
1962/63	462	7.7	3.5	234.90	822	1,779	0.3	42
1963/64	566	7.7	4.2	210.95	886	1,565	0.3	52
1964/65	602	7.5	4.3	179.52	772	1,282	0.3	47
1965/66	684	7.9	5.2	186.40	969	1,417	0.4	69
1966/67	700	7.9	5.3	163.10	864	1,234	0.6	116
1967/68	744	8.5	6.1	192.02	1,171	1,574	1.1	175
1968/69	784	8.0	6.1	206.26	1,258	1,605	1.0	124
1969/70	770	8.4	6.3	252.11	1,588	2,062	0.8	241

* Figures relate to the first calendar year indicated. It is not possible to determine precisely whether or not Channel Islands lettuce is grown under glass, either heated or unheated, or in the open. However, as supplies arrive mainly during May they may be regarded as supplementing supplies of home grown unheated lettuce.

N.S.D. Not separately distinguished.

TABLE 25
Lettuce (frames)
U.K. production

Year	Home Grown (Agricultural Holdings only)					
	Cropped area	Gross yield	Output	Growers' farm gate price	Value	Value per acre
	acres	tons/acre	'000 tons	£/ton	£'000	£
1956/57 . . .	600	8.0	4.8	N.S.D.	N.S.D.	N.S.D.
1957/58 . . .	603	8.0	4.8	139.16	668	1,108
1958/59 . . .	576	7.4	3.7	135.58	501	894
1959/60 . . .	545	7.3	3.9	156.26	609	1,117
1960/61 . . .	477	8.1	3.8	159.98	608	1,275
1961/62 . . .	434	8.7	3.7	244.46	904	2,083
1962/63 . . .	410	7.7	3.1	234.90	728	1,776
1963/64 . . .	450	7.7	3.3	210.95	696	1,547
1964/65 . . .	400	7.5	2.9	179.52	521	1,303
1965/66 . . .	440	7.9	3.4	186.40	634	1,441
1966/67 . . .	450	7.9	3.4	163.10	555	1,233
1967/68 . . .	460	8.5	3.8	192.02	730	1,587
1968/69 . . .	490	8.0	3.8	206.26	784	1,600
1969/70 . . .	530	8.5	4.3	252.11	1,084	2,045

N.S.D. Not separately distinguished.

Imports: It is not possible to determine precisely whether or not imported lettuce is grown under glass, either heated or unheated, or in the open. However, as the imports arrive mainly during the months of November to April these may be regarded as supplementing supplies of home grown heated lettuce.

TABLE 26
LETTUCE
Concentration of Glasshouse Lettuce at 15th January, 1970
(all figures rounded to nearest acre)

	Unheated acres				Heated acres				Total acres
	Early	Mid	Late	Total	Early	Mid	Late	Total	
England and Wales . . .	66	429	331	827	129	380	132	641	1,468
<i>Leading Counties</i>									
Lancs.	19	40	67	126	37	64	39	140	266
Yorks. E.R. . . .	6	47	64	117	14	81	16	111	228
West Sussex . . .	2	55	8	65	6	49	2	57	122
Essex	2	26	8	36	13	16	10	39	75
Worcester	2	29	19	50	3	14	3	20	70
Bedford	2	20	17	39	3	17	8	28	67
Yorks. W.R. . . .	2	21	14	37	4	10	3	17	54
Hampshire	2	18	12	32	3	14	3	20	52
Suffolk	2	24	8	34	1	6	1	8	42

Note:
'Early' is lettuce completely cleared between 1st September, 1969 and 14th January, 1970.
'Mid' is in ground at date of census, 15th January, 1970.
'Late' is to be planted between 16th January and 31st March, 1970.

18. Competition is increasingly forcing growers to hasten their search for ways of cutting their costs. Some growers with older glass and equipment have been able to sell their land for building and to move their businesses to more favourable areas and re-equip them with new glass; others have retired from the industry. Yet others, who did not wish to move or who could not raise sufficient capital to do so, have kept their old glasshouses but modernized the interiors. Increases in maintenance and production costs are causing concern particularly the higher prices for heavy fuel oil for heating glasshouses. It is possible that the relatively inexpensive plastic structures now being developed may play a major part in the future re-equipping of some enterprises.

Structure

19. Between July 1967 and July 1969 there has been an increase in the number of holdings in all glasshouse area size groups with the exception of those in the four to ten acres group. The increase in the number of very large glasshouse holdings is linked with the entry into the industry of some few commercial enterprises with no previous direct interest in glasshouse production. This has brought about a new source of finance into the industry, and the resulting construction of very large units, usually linked to marketing outlets, suggests an effective combination capable of withstanding strong competition. It has also created a demand for managers capable of running large-scale production units.

20. At the July 1969 England and Wales census there were 10,347 glasshouse holdings totalling 4,206 acres. The Scottish figures were 970 holdings with 265 acres of glass and there were 52 acres of glass on 152 holdings in Northern Ireland. The totals include flowers and fruit, the total vegetable acreage being about 62 per cent in England and Wales and 70 per cent in Scotland. The Northern Ireland equivalent was about 60 per cent principally tomatoes combined with lettuce. At 4 July 1969 the England and Wales vegetable crop distribution was:

Heated tomatoes	...	...	...	...	1,167 acres
Unheated tomatoes	...	...	...	...	1,028 acres
Cucumbers	...	...	...	...	385 acres
Others	...	...	...	...	49 acres

Some 400 acres of glass was not in use. West Sussex, Hertfordshire, Essex and Lancashire are the areas of main concentration and it is noticeable that the Lancashire holdings are on average only a third of the size of those in the other three counties. In Essex 70 per cent of the total area is in blocks of over 1 acre. Between March 1965 and March 1969 there was nearly a 25 per cent reduction (412 acres) in the area of pre-1945 glass in England and Wales. This was more than offset, however, by newly erected glass resulting in a 15 per cent overall increase in the glasshouse acreage (535 acres) during the period. Between August 1966, when a new Horticulture Improvement Scheme providing grant aid for new glasshouses was introduced, and March 1969, 808 acres of new glass was erected.

21. The June 1969 census showed 7½ per cent of the total glasshouse acreage as being on ten holdings each with 20 or more acres of glass. Two-

thirds of the holdings which carry glass have, however, less than one quarter acre of glass apiece ; and 74 per cent of the total glasshouse area is on holdings with 4 acres or less of glass. For many growers indeed 4 acres seems to be the sticking point at which the enterprise is considered to constitute a management unit large enough to satisfy their ambitions, and beyond which economies of scale would tend to be offset by increasingly formidable management problems. The step to much larger businesses is, therefore, a major one ; and although it may be possible to overcome these problems by organizing the businesses into multiple 4-acre units each under its own manager, the availability of capital sets further limits to expansion.

Equipment

22. As regards the re-equipment of glasshouses, the March 1969 Special Inquiry based on January 1969 acreages showed 3,057 acres of heated glass, an increase over 1967 of approximately 7 per cent. In 1967 the proportion of glass heated by oil fuel as against solid fuel was 60/40. By 1969 the ratio had changed to 70/27 with 3 per cent heated by paraffin. Hot water boilers declined in importance between 1967 and 1969. In 1967 70 per cent of the total glasshouse area was served by these, but by 1969 this percentage had dropped to 55. The steady increase in automatic or semi-automatic watering on ground beds noticeable in 1967 has continued. The glasshouse area with automatic ventilation has doubled between 1967 and 1969 and the area using carbon dioxide enrichment by propane or pure gas has risen from 337 acres to 452 acres.

Investment

23. The greater part of the grant aid approved in England and Wales under the Horticulture Improvement Scheme 1966 has been taken up by the glasshouse sector, the total investment involved in proposals submitted by glasshouse businesses in England and Wales and approved from August 1966 to December 1970 being £37.1 million out of a total for the scheme of £52.6 million. In 1969 there was a significant rise in the number of applications for very large single proposals for grant aid but this number decreased by a half in 1970.

TABLE 27

ANALYSIS OF EXPENDITURE UNDER THE HORTICULTURE IMPROVEMENT SCHEME, ENGLAND AND WALES

Approvals under the 1966 Scheme (Horticultural Production Businesses only)
Glasshouse Sector

Grant for	Cost of Schemes Approved for Grant (Jan.-Dec.)			
	1967	1968	1969	1970
	£	£	£	£
Site preparation/roads, etc.	117,551	151,656	231,677	164,235
New Glasshouses	3,552,579	4,259,846	4,733,210	4,264,639
All other buildings	431,028	650,983	929,649	685,684
Plant for control of environment	579,708	632,496	798,217	892,823
All other plant and equipment for production	388,296	346,737	540,246	585,382
Gas/Electricity/Water/Sewage	165,491	199,943	226,780	244,540
Heating Systems	1,917,617	2,207,364	2,333,743	2,161,715
Plant for storage and preparation for market	39,120	69,023	132,085	193,697
All other items	18,088	31,047	17,839	28,281
Total	£7,209,478	£8,549,095	£9,943,446	£9,220,996

24. Whilst expansion in the glasshouse acreage has continued, there has been some reduction in the rate at which H.I.S. proposals for new glasshouses have been coming forward, and an increase in the proposals for expenditure on plant for storage and preparation for market. This may indicate that saturation point is approaching in the erection and equipment of new glass, and that growers are now concentrating on consolidation rather than expansion and in particular on investment in the storage and marketing rather than the production sides of their enterprises.

Marketing

25. Growers are disturbed by the effect that rising costs of distribution may have on their own returns. For the small grower, the most profitable channel will often be direct sale to local retailers. He can offer the retailer really fresh produce whilst incurring the minimum expenditure on transport, and thus obtaining a larger share of the retail price. His knowledge of outlets need not extend far beyond his immediate locality, and he is left free to concentrate his main effort on the production side of his business. Alternatively, there is the possibility of sale to the secondary wholesalers who collect from small growers where holdings are concentrated within reasonably small areas. Where outlets of this sort do not exist costs of marketing relatively small quantities of produce may have a serious effect on profitability.

26. For the medium grower, local outlets may be insufficient to take up his output but he does not operate on a large enough scale to make direct sales to large retailers or processors who demand continuity of supply. He will, therefore, tend to rely on the wholesale market and will receive a smaller return per unit of produce than the small grower, since he is in effect paying for the greater marketing expertise demanded for sales outside his immediate locality.

27. Large growers, like small ones, are better placed to by-pass the wholesale market than is the medium grower. Their most profitable outlets will often be direct sale to supermarkets or big stores, although this outlet requires greater attention to specific grading requirements which not all growers are willing or able to attain. Like the small grower, large-scale growers will tend to get a relatively high share of the retail price, partly because they are to a large extent supplying their own marketing expertise (for which they do, of course, pay within their own organization, by the expenditure of their own time or that of their employees), and partly because of lower transport, packaging and handling costs where produce goes direct from grower to retailer. But even the large-scale grower may have to rely on sale through commission agents towards the beginning and at the end of the season when he cannot keep up large regular supplies.

28. The grower's problem generally is to secure a larger share of the retail price, perhaps by shortening the distributive chain by cutting out increasingly costly processes of transport, packaging and handling. Direct sale to the retailer is the simplest and most obvious way of achieving this and the retailer gains in fresher produce and more certain quality—for if he has any complaint, he can go direct to the grower. Although the number of small traditional retailers is decreasing, they still provide an outlet for a substantial proportion of glasshouse produce. At the other end of the scale,

supermarkets and large stores offer opportunity for direct grower-to-retailer sale—although it should be noted that in America the quantity of fresh produce handled by supermarkets is beginning to fall. Continuity of supply is important, however, in direct sales to retailers ; and the retailer may also be reluctant to buy all his produce from the grower during the home season because he wants to maintain links with the wholesaler on whom he must rely for imported produce during the rest of the year. There is, therefore, still likely to be considerable reliance on wholesale markets by growers in the bigger as well as the middle size groups, and wholesalers selling either in markets or through distributive salesmen continue to handle the greater part of the sales.

29. There is a general tendency towards a greater concentration of buying power in all commercial outlets whether wholesale, retail or processing. Independent growers' best answer may lie in creating a comparable concentration of their own selling powers ; and for small and medium sized growers this may only be possible through some form of co-operative selling arrangement. The obstacles to co-operation lie not only in growers' reluctance to surrender some of their individual freedom of action but also in the fact that it may not be economically worth while unless the scale of the concentration is sufficient to absorb the costs involved. Moreover, difficulty is often experienced in finding a good manager at a salary which the co-operative can afford. The geographical distribution of glass in Great Britain is such as to facilitate the formation of co-operatives.

30. One recent development in the by-passing of the normal distributive chain is the expansion of direct sales to the consumer, either at the farm gate or through garden centres. There may be a possibility of developing the garden centre trade to cover most types of consumable horticultural produce—although the operator of a sizeable and successful garden centre is likely to find himself assuming something of the role of middleman in so far as he finds it necessary to buy from other growers in order to offer his consumers a range of products and continuity of supply.

APPENDIX A

Special Enquiries into Glasshouse Equipment in England and Wales

The results of the special enquiry held in March 1969 are given in the following Table. The information about the age of glasshouses, methods of heating etc. was collected on a voluntary basis from samples of about 1,500 glasshouse holdings. The results are liable to a degree of sampling error.

TABLE 28

	Area of Existing Glass (acres) as at:—			Changes 1965-69
	March 1965	March 1967	March 1969	
1. Age of Glass Erected:				
a. Pre-1945	1,823 (50%)	1,611 (42%)	1,411 (34%)	-412 (-23%)
{ In years 1945-'62 (incl.)	1,470 (40%)	—	—	+488 (+33%)
b. { In years 1945-July '64	—	1,674 (43%)	—	
{ In years 1945-July '66	—	—	1,958 (47%)	
{ In years 1963-Mar. '65	349 (10%)	—	—	+459 (+131%)
c. { From Aug. 1964-Mar. '67	—	568 (15%)	—	
{ From Aug. 1966-Mar. '69	—	—	808 (19%)	
2. Ventilation				
Glasshouse area which has automatic ventilation (acres)	59.0	193.4	423.4	
Percentage of total glasshouse area	1.6	5.0	10.1	

	March 1965		March 1967		March 1969	
	Acres	Per cent. of total heated glasshouse area	Acres	Per cent. of total heated glasshouse area	Acres	Per cent. of total heated glasshouse area
3. Heating*						
(i) Automatic control .	1,427.8	51.0	1,877.9	65.5	2,132.7	69.8
(ii) Glasshouse area equipped for heating by:						
Solid fuel, hand stoked .	921.0	32.9	688.6	24.0	479.0	15.7
Solid fuel auto- matic stoking .	475.9	17.0	426.0	14.9	343.5	11.2
Oil:						
35- 195 secs. .	228.8	8.2	400.1	14.0	623.4	20.4
200- 945 secs .	364.0	13.0	470.6	16.4	466.4	15.2
950-2,995 secs .	495.1	17.7	556.2	19.4	597.85	19.6
3,000 secs and over .	298.3	10.6	306.6	10.7	468.8	15.3
Paraffin heaters .	56.1	2.0	106.7	3.7	99.0	3.2
(iii) Heat produced by:						
Hot water boilers .	—	—	2,005.1	69.9	1,672.3	54.7
Steam boilers .	—	—	705.4	24.6	871.1	28.5
(iv) Heat distributed by:						
Pipes over 2 inches in diameter .	2,214.5	79.0	2,182.1	76.1	1,892.3	61.9
Pipes 2 inches or less in diameter	409.5	14.6	513.1	17.9	705.2	23.1
Apparatus for blowing or duct- ing warm air .	105.0	3.7	244.6	8.5	322.7	10.6
4. Methods of Watering						
Ground beds or borders watered by:						
Any semi-automatic watering system con- trolled from a fixed point (excluding hand/hose watering)	1,525.6	41.9	2,039.1	52.9	2,536.4	60.7
Hand/hose watering .	1,739.2	47.8	1,400.4	36.3	1,266.2	30.3
Crops on permanent benches watered by:						
Capillary bench methods . . .	16.3	0.4	22.5	0.6	41.3	1.0
Other semi-automatic methods (on sand or onto pots, etc.)	65.0	1.8	66.1	1.7	79.4	1.9
Hand/hose watering .	209.1	5.7	259.4	6.7	343.4	8.2
5. CO ₂ Enrichment						
Equipped for CO ₂ en- richment:						
Pure gas from tank, cylinder or liquifier .	48.7	1.3	68.7	1.8	131.7	3.1
Propane	203.9	5.6	268.3	7.0	319.9	7.7
Paraffin	25.1	0.7	44.2	1.1	46.3	1.1

* The results for the different categories in this section are not mutually exclusive and individual estimates cannot be added together to give an estimate of the total heated area of glasshouses at the enquiry date. The percentages for the 1969 enquiry relate, therefore, to the total heated glasshouse area of 3,057 acres as returned at the January 1969 census. For the 1967 enquiry, the percentage is related to the total heated area of glasshouses of 2,868 acres as returned at the January 1967 census, and 2,802 acres returned at January 1965 for the 1965 enquiry.

APPENDIX B

Scottish Glasshouse Survey, January 1970

In Scotland there were 970 holdings with glasshouses in 1969, and between them they had 265 acres of glass. The cropped acreage for the year was 379 acres almost 70 per cent of which is accounted for by vegetables. The main concentration is in Lanarkshire, which has half the total area of glass.

Percentage distribution of (A) Holdings and (B) Glasshouse Acreage 1969

Glasshouse Area		A	B
<i>sq. ft.</i>	<i>acres (approx.)</i>		
1-9,999	under $\frac{1}{4}$	69.3	21.3
10,000-49,999	$\frac{1}{4}$ - $1\frac{1}{4}$	27.2	50.9
50,000-99,999	$1\frac{1}{4}$ - $2\frac{1}{2}$	2.5	13.5
100,000 and over	$2\frac{1}{2}$ and over	1.0	14.3

Percentage distribution of Cropped Acreage 1969

Tomatoes—heated	50.8
cold	2.3
Lettuce—heated	9.7
cold	4.0
Cucumbers	1.7
Other Vegetables and Fruit	0.1
Chrysanthemums	15.6
Pot Plants	2.7
Bulbs for Forcing	6.3
Other Flowers and Shrubs	2.2
Bedding and Vegetable Plants	4.6

<i>Age of Glass</i>	<i>Acres</i>
Erected before 1945	163
Between August, 1945-July, 1966	64
Between August, 1966-July, 1968	21
August, 1968 onwards	17
Total.	265

Tomatoes

1966 220 acres

1969 201 acres (of which 192 acres were heated)

Half the 1969 acreage was in Lanarkshire and 10 per cent in Ayrshire.

Percentage distribution of (A) growers and (B) acreage of heated tomatoes in 1969

	A	B
Size of Crop (acres)		
2½ and over	1.0	14.2
1-2½	4.6	19.4
¾-1	30.1	49.8
under ¾	64.3	16.6

80 per cent of the 293 holdings with ½ acre or more of heated tomatoes fell into the same size group for heated tomatoes as for total glasshouse area. They accounted for 85 per cent of the heated tomato area on such holdings. All holdings with an acre or more of heated tomatoes come into this category.

Cucumbers

1966 7½ acres

1969 6½ acres

In 1969 1 grower had 6 acres, and the remaining ½ acre was shared by 23.

Lettuce

1966 48 acres

1969 52 acres (of which 37 acres were heated)

In 1969 half of the total glasshouse lettuce area was in Lanarkshire, and a substantially higher proportion of the unheated glasshouse lettuce area.

Percentage Distribution of (A) growers and (B) acreage of heated lettuce, 1969

	A	B
Size of Crop (acres)		
1 and over	0.8	8.5
¾-1	14.7	49.6
under ¾	84.5	41.9

Record of Study by the Glasshouse Group (Mushroom-Sub-Group)

1. There has for some years been a steady upward trend in the estimated cropped area of mushrooms in the United Kingdom. At the same time yields have increased through the application of improved techniques and, as a consequence, output from agricultural holdings has increased significantly, reaching an estimated 36,400 tons (82m. lb.) in 1969/70 valued at some £10½ million at the farm gate. Estimates of output are based on enquiries of producers augmented by special surveys and not on the use of census acreages from which the statistics for most horticultural crops derive. The most recent mushroom survey was conducted in 1969 by the Ministry of Agriculture in conjunction with the Mushroom Growers' Association and covered Great Britain. At the same time a separate survey was carried out by the Ministry of Agriculture for Northern Ireland. The results of these surveys are set out in an appendix to this report.

2. Mushrooms are of particular importance in Northern Ireland. They are indeed one of the chief horticultural crops grown there, with an estimated total value of £1,008,000. Three-quarters of the crop is sent to Great Britain, mainly to markets in Scotland and north-east England. Nearly a quarter of these sendings go by air.

3. Both in England and Wales and in Northern Ireland, there appears to be a continuing trend towards the concentration of the major production units in the hands of a very small number of big growers. In England and Wales, over half the 1968 output by respondents to the 1969 survey was attributable to 6 growers; and in Northern Ireland, 5 out of 253 growers owned over a quarter of the total bedding area, accounting for 42 per cent of total output (approximately 4 million lb.).

4. Scotland produces a relatively small quantity of mushrooms: Scottish respondents to the 1969 Survey returned sales of only ¼m. lb. in 1968.

Outlets

5. The 1969 Survey indicates that in 1968 by far the larger part of the crop was sold on the fresh market, with processors taking less than a quarter of respondents' output in England and Wales, and less than 1 per cent in Scotland. The Northern Ireland Survey shows that about 10 per cent went to processors. Mushrooms are available all the year round, so there is no need to preserve them against seasonal shortages; and it has been the policy of the Mushroom Growers' Association to promote the sale of fresh rather than processed mushrooms, in order to take advantage of the natural protection which so perishable a product enjoys in its home market. Most of the mushrooms that are sold for immediate consumption go through the wholesale markets, the survey showing only 15 per cent of respondents' sales going direct to retailers in England and Wales, and 5 per cent in Scotland; the corresponding figure in Northern Ireland was 10 per cent. There is some evidence that direct sales are on the increase. A small proportion of the crop is sold direct to hotels and other catering establishments.

6. Nevertheless, sales to processors are increasing. The survey suggests that in England and Wales they had risen from 16 per cent of respondents' sales of mushrooms in 1966 (7·5m. lb.) to 23 per cent (12·7m. lb.) by 1968. Canning, either alone or as an ingredient with other goods, is the main processing outlet;

TABLE 29

Mushrooms

U.K. production and imports

Year	Home Grown (Agricultural Holdings only)						Net Imports*		Channel Islands*		Total Supplies by Weight
	Cropped area	Gross yield	Output	Growers' farm gate price	Value	Value per acre	Total quantity	Total value	Total quantity	Total value	
1956/57	262	29.0	'000 tons 7.6	£/ton 402.09	£'000 3,039	£ 11,599	'000 tons 0.5	£'000 164	'000 tons ...	£'000 ...	per cent 94
1957/58	324	29.0	9.4	381.51	3,574	11,031	0.4	150	—	—	96
1958/59	403	29.0	11.7	354.33	4,135	10,261	0.5	177	...	...	96
1959/60	471	29.1	13.7	362.40	4,954	10,518	0.5	152	...	...	96
1960/61	537	29.1	15.6	378.38	5,899	10,985	0.7	213	—	—	96
1961/62	599	29.0	17.4	368.37	6,428	10,731	0.7	208	—	—	96
1962/63	649	29.1	18.9	336.32	6,353	9,789	0.9	231	—	—	95
1963/64	679	30.9	21.0	313.81	6,590	9,705	0.9	286	—	—	96
1964/65	733	33.5	24.5	322.83	7,890	10,764	1.2	338	—	—	95
1965/66	809	33.5	27.1	295.12	7,986	9,871	1.4	408	...	1	95
1966/67	749	38.4	28.8	291.76	8,388	11,199	1.5	435	...	2	95
1967/68	771	40.1	30.9	274.16	8,477	10,995	1.4	393	...	4	96
1968/69	824	41.9	34.5	291.43	10,060	12,209	1.3	314	...	—	96
1969/70	828	43.9	36.4	295.68	10,748	12,981	1.0	314	...	...	97

* Imports relate to the first calendar year indicated. ... Less than 50 tons or less than £500. — Nil or negligible.

and it might well increase more rapidly if the smaller and medium-scale growers were able to offer more regular and continuous supplies. Freezing is not as yet a very attractive commercial proposition, for the mushroom deteriorates very quickly after being de-frosted, and with a year-round supply of fresh mushrooms the frozen product cannot command a sufficiently high price to make it economic. The demand for frozen mushrooms may, however, increase as it becomes more common for people to have deep-freeze cabinets in their homes. Accelerated deep-freeze drying has been tried, but although the product reconstitutes well, the process is too expensive at present to be commercially practicable.

7. Pre-packaging in standard packs would make for ease of selling in large stores, and could be expected to encourage demand. It does, however, present considerable problems for mushroom growers, since mushrooms shrink after having been in the pack for only a very short time. Indeed, their shelf life may be little more than a day, unless they are packed in film which inhibits respiration and enables the mushrooms to retain their appearance for a longer period.

Possibilities of further expansion

8. The spectacular increase in sales of mushrooms since the early 1950s has been associated with the fall in prices made possible by the industry's rapid expansion and by its progressive increases in productive efficiency. No doubt yet further increases in technical efficiency, and further economies arising from the extension of large-scale production, can be expected in future; but it seems doubtful whether they will be sufficient to offset the general tendency, throughout the industry, for rising production costs to overtake revenue, or to allow the downward trend in mushroom prices to continue at anything like the same speed as in the past fourteen or fifteen years. Although the mushroom industry has probably not yet reached its peak, it therefore seems unlikely that the consumption of mushrooms, and hence the expansion of the industry, will continue at more than a very moderate pace unless demand can be stimulated by some new development in the handling or marketing of the crop; this underlines the need for a deliberate policy of sales promotion on the part of the industry.

9. One of the problems is the mushroom's liability to production flushes which are difficult to control. It is difficult for an individual grower to guarantee a steady supply at the rate of more than 40 per cent of his total productive capacity. For all but the largest growers, or groups of growers, this is a serious hindrance to the making of forward contracts with processors or other buyers and to the exploitation of the increasing demand from supermarkets and chain stores, which require a continuous supply of high-quality produce. Research into methods by which greater continuity of supply could be assured might make a substantial contribution to the industry's profitability or, if the problem continued to prove insoluble at the point of production, its effects might be alleviated by the development of effective methods of cool-storing excess supplies for short periods. It is reported that in the U.S.A. mushrooms are kept in cool-storage all the way from grower to consumer; but the techniques of cooling and subsequently storing the crop have not yet been mastered in this country.

10. Co-operative marketing could make a larger contribution to the solution of these problems. The industry would also benefit from improved market intelligence, and from increased emphasis on the importance of marketing as an aspect of general managerial responsibilities. This is more particularly true of the smaller grower; with the increasing development of large-scale businesses

with a direct interest in promoting sales of mushrooms under their own brand-names, the need for up-to-date methods of marketing and publicity is unlikely to be overlooked.

Imports

11. Imports into the U.K. of fresh mushrooms amount to between 3 per cent and 5 per cent of total supplies. They come almost entirely from the Irish Republic with only very small and intermittent supplies from other countries, and they have been declining in both quantity and value since 1966. Growers in Northern Ireland are, however, apprehensive of the effect of new Government grant schemes in the Irish Republic to stimulate mushroom production, especially since the Republic has the advantage of readily available supplies of peat and horse manure, and has fewer labour problems.

Labour costs

12. Labour for picking and packing is difficult to get and is the largest single item in production costs, accounting for just over 20 per cent of the total, whilst approximately a further 20 per cent is accounted for by other labour costs. Many growers consider that the industry's greatest need is for the development of an efficient picking machine.

Transport

13. Rail transport is unsatisfactory, because the produce is handled too much and often fails to reach the market on time. Moreover, the amount of space which mushrooms take up makes rail carriage an expensive form of transport. Most growers find road transport more economic, particularly where they can provide their own vehicles.

Future developments

14. Although the industry's methods of production are up to date and efficient, there is no doubt that any contribution which research could make to solving the problems of the prevention and eradication of disease, of perfecting cooling and short-term cool storage, of ensuring continuity of cropping and furthering the development of an efficient picking machine, would be welcome.

APPENDIX C

Survey of Mushroom Sales in Great Britain 1969

In 1969 the Ministry of Agriculture, Fisheries and Food and the Mushroom Growers' Association co-operated in carrying out a further survey of growers in England and Wales and in Scotland. The scope of this survey was more limited than that previously conducted in 1967 in that it sought information only on sales and did not cover items such as area, yields, labour and equipment. Growers were asked to give details of their sales, by type of outlet, for the calendar years 1967 and 1968 and to forecast their total sales for the calendar year 1969.

2. The survey results are based on a voluntary postal enquiry of virtually all growers who had completed a return in 1967. Of the 224 questionnaires sent out, 187 were returned completed, representing a response rate of about 83 per cent in terms of the number of holdings surveyed and 93 per cent in terms of their 1966 sales. The sample included a small number of Scottish growers but no separate assistance was sought on this occasion from the Department of Agriculture and Fisheries for Scotland and no attempt was made to cover Northern Ireland.

3. It must be emphasised that the sales figures given in the various tables are based on returns received and do not represent the total production in the two countries concerned (see final paragraph).

Total Sales

4. The 1967 survey returns for England and Wales originally gave a figure for total sales of mushrooms of $51\frac{1}{2}$ million lb. in 1966, but subsequent corrections to information then received has resulted in a revised sales total of $50\frac{1}{2}$ million lb. for that year. Respondents to the 1969 enquiry, who accounted for $46\frac{1}{2}$ million lb. of the revised figure, showed increases in sales in 1967 and 1968 of 6 per cent and 17 per cent respectively compared with their 1966 sales; and their forecast for 1969 brought the increase up to 26 per cent. These results confirm the upward trend in sales which growers were forecasting in 1967 although the expansion has been at a slower rate than they expected: forecasts made by responding growers in 1969 approached a level which, in the previous survey, they had expected to reach by 1968. There is evidence of a similar underlying trend in Scotland (see Table 30) although respondents' absolute levels of sales in 1967, 1968 and 1969 were lower than in 1966, due mainly to one grower having gone out of production in 1967. Thus Scottish respondents' sales for 1969 represent a fall of about 25 per cent compared with 1966, but a rise of the same amount when compared with 1967.

Sales outlets

5. The 1967 survey showed that in 1966 sales to market were the most important outlet for England and Wales growers, accounting for 66 per cent of total sales; a further 19 per cent went direct to retail outlets and to consumers, with the remaining 15 per cent being taken by processors. Sales in 1966 of the respondents to the 1969 survey were in very good agreement with this pattern (see Table 31); but their replies to the more recent enquiry revealed a falling off in the share of the crop going to market in 1967 to 59 per cent, with a further slight fall in 1968. Direct sales to retail outlets and to consumers showed little variation

in these two years, but those to processors rose appreciably in 1967 to account for nearly a quarter of the total sales. A further analysis of the returns indicated that all but a few growers disposed of the larger part of their crop through wholesale markets and 60 per cent made direct sales to retailers. Only seven growers, chiefly those with very large enterprises, supplied mushrooms to the processing industry, perhaps reflecting the development of canning plants as adjuncts to growing interests.

Size distribution

6. A comparison with 1967 survey results, when the distribution was by area size group, can only be made in the most general terms. In England and Wales on that occasion almost two-thirds of the total sales were made by 19 of the 223 respondents (about 9 per cent), with, at the other end of the scale, some 48 per cent of the growers—108 of the 223—having less than 7 per cent of the sales between them. In 1968, the 15 leading growers of the 164 respondents who were showing sales for that year (the top three groups from Table 32) accounted for almost three-quarters of an increased total, and conversely, 83 small producers had less than 6 per cent of the sales. Although not quite comprehensive, these results do confirm the trend in the industry towards larger production units which has been observed over the years. Because of the small number of growers involved no distribution for Scotland is shown.

United Kingdom production estimates

7. As already stated the data presented relate solely to the returns received, the primary aim of the enquiry being to ascertain recent trends in sales rather than absolute levels of production. Nevertheless, the results have been used in deriving total mushroom production in the United Kingdom. After making allowance for growers not covered by the survey and including separate estimates provided for Northern Ireland, total U.K. production from all growers on both agricultural and non-agricultural holdings for the year 1968/69 (June/May) is estimated to have reached almost 90 million lb.

SURVEY OF MUSHROOM SALES 1969

SALES OUTLETS

(Summary of Returns Received)

TABLE 30

Scotland

	1966		1967		1968		1969 Forecast	
	'000 lb	per cent	'000 lb	per cent	'000 lb	per cent	'000 lb	per cent
To Market .	705	98	418	96	472	94	n.a.	
To Retailers .	11	2	14	3	24	5	n.a.	
To Consumers (incl. hotels etc.) . . .	1	...	3	1	2	1	n.a.	
To Processors	—		—		2			
Total Sales .	717	100	435	100	500	100	546	100
Total sales as percentage of 1966 .		100		61		70		76

TABLE 31
England and Wales

	1966		1967		1968		1969 Forecast	
	'000 lb	per cent	'000 lb	per cent	'000 lb	per cent	'000 lb	per cent
To Market .	30,341	65	29,268	59	31,146	57	n.a.	
To Retailers .	6,535	14	6,156	13	7,923	15	n.a.	
To Consumers (incl. hotels etc.) .	2,334	5	2,595	5	2,917	5	n.a.	
To Processors	7,468	16	11,336	23	12,654	23	n.a.	
Total Sales .	46,678	100	49,355	100	54,640	100	58,686	100
Total Sales as percentage of 1966 .		100		106		117		126

TABLE 32

TOTAL SALES AND NUMBERS OF HOLDINGS BY SALES SIZE GROUP 1968

*(Summary of Returns Received)**England and Wales*

Size groups total sales (⁰⁰⁰ lb.)	Less than 10	10 to 19.9	20 to 39.9	40 to 79.9	80 to 119.9	120 to 199.9	200 to 399.9	400 to 999.9	1,000 1,999.9	2,000 to and over	Total recorded
Number of holdings .	12	12	23	36	18	28	20	5	4	6	164
Total sales (⁰⁰⁰ lb.) .	56	165	672	2,148	1,737	4,173	5,987	3,542	5,293	30,867	54,640
Percentage distribution of total sales .	0.1	0.3	1.2	3.9	3.2	7.6	11.0	6.5	9.7	56.5	100

TABLE 33

Survey of Mushroom Sales in Northern Ireland, 1969

Total annual cropping area 4,536,968 sq. ft.

Actual area of bedding space:

Trays 1,031,018

Shelves 554,044

Total 1,585,062 sq. ft.

Total number of growers 253

Growers classified as to bedding area:

<i>sq. ft.</i>	<i>No. of growers</i>
Under 1,000	11
1,000-2,000	42
2,000-5,000	111
5,000-10,000	66
10,000-15,000	13
15,000-20,000	5
20,000-30,000	Nil
Over 30,000	5

Labour engaged on mushroom production

Owner/family

Full-time 136

Part-time 313

Other labour

Full-time 229

Part-time 115

Total 793

Production and marketing:

	<i>lb.</i>
G.B. markets	7,136,178
N.I. wholesalers	369,090
Retailers	955,107
Canners/processors	971,697
Total	9,432,072

Estimated future production 9,846,533 lb.

Average production 2.08 lb. per sq. ft.

Record of Study by Flowers Group

1. In 1969/70 the estimated value of U.K. flower output, comprising protected, open-grown and bulbs, from agricultural holdings was about £29½ million at farm-gate prices—13 per cent of the value of all horticultural output—as compared with some £26 million in 1966/67. Over the same period the value of flower production under glass increased by approximately 11 per cent, which is, even so, little more than half the rate of increase in the value of all glasshouse crops during that period. In England and Wales approximately 25 per cent of the total glasshouse acreage is devoted to flower production, i.e., a little over 1,000 acres (see Table 34).

2. We have made a special study of carnations, freesias, pot plants, chrysanthemums, bulbs for forcing, irises, gladioli and dahlias; and we have added roses for cutting to this list. We have concentrated mainly on carnations, chrysanthemums, pot plants and roses, since we considered that they merited most attention from the point of view of quantity grown and value, and have given less attention to irises, gladioli and dahlias, which are largely non-specialist crops. We have also considered general problems of marketing, with particular reference to the development of new outlets at home and abroad and to the costs and difficulties of distribution.

CHRYSANTHEMUMS

3. The estimated cropped area of chrysanthemums grown under glass (including frames) in the U.K. in 1969/70 was 756 acres, almost one-third of the total acreage of flowers grown under glass; this is lower than in 1966/67. The acreages in England and Wales of the different types of glasshouse chrysanthemum—AYR, pot plants, early flowering chrysanthemums, cuttings and other types of chrysanthemum including mid and late season flowering plants—are shown in Table 34.

4. AYR production now accounts for a greater proportion of the annual production of glasshouse grown chrysanthemums than any other system. There are signs, however, that the production of AYR chrysanthemums is beginning to level out in response to falling prices. This is a high cost crop depending on precision growing; and for a product of good quality it is necessary to have modern glass and equipment, good light and skilled management. It is in fact a crop for the better-than-average grower working with better-than-average glass, and there is probably little room for further expansion at the present time and certainly not without further investment in modern glass.

5. The production of cuttings for sale is still fairly specialized although rather more growers are now involved in this trade than was the case a few years ago. The degree of specialization is not fully evident from the published statistics derived from the glasshouse census, since these include a large number of smaller growers who grew cuttings for their own use.

6. Outdoor chrysanthemums have declined in acreage. Because of the high labour requirements and susceptibility to weather damage, and with increasing competition from AYR flowers, this decline seems likely to continue.

TABLE 34

GLASSHOUSE CENSUSES—JULY, 1969 AND JANUARY, 1970

Area of glass under selected flower crops in England and Wales

Total Area of Glass	July, 1969 (acres) 4206	January, 1970 (acres) 4172
	per cent.	per cent.
Area of glass under:		
<i>Chrysanthemums</i>		
Ayr	105 (2.51)	107 (2.56)
Cuttings	45 (1.07)	53 (1.28)
Pot plants	41 (0.98)	37 (0.90)
Early flowering	54 (1.27)	—
All others	174 (4.15)	94 (2.25)
Total	419 (9.98)	291 (6.99)
<i>Pot plants (not chrysanthemums)</i>		
Flowering	190 (4.53)	194 (4.65)
Foliage	47 (1.11)	44 (1.05)
Total	237 (5.64)	238 (5.70)
<i>Carnations</i>		
Flowers	226 (5.37)	188 (4.50)
Cuttings	9 (0.21)	5 (0.13)
Total	235 (5.58)	193 (4.63)
<i>Roses</i>		
	117 (2.78)	122 (2.93)
<i>Bulbs for forcing</i>		
	— —	174 (4.17)
<i>Freelias</i>		
	— —	22 (0.52)
Total	1,008 (23.98)	1,040 (24.94)

The figures in brackets show these crops as a percentage of the total area of glass.

POT PLANTS

7. Growers tend to regard pot plants as a basic crop for regular production. Much of the larger scale production is concentrated in the south and south-east. Since January 1967 the increase in the acreage of pot plants, both flowering types and those grown for foliage, has been broadly in line with the increase in the total glasshouse acreage in England and Wales. At January 1970 pot plants accounted for 238 acres (5.7 per cent) of the glasshouse acreage, almost exactly the same proportion as in 1966/67. Over the period the acreage devoted to flowering types has increased, whilst the acreage of foliage plants has remained fairly static. This is probably a reflection of consumer preference but it may also be attributable to the continuing modernization of the glasshouse acreage—flowering pot plants are not so tolerant of the poorer light conditions in the older glasshouses as are foliage plants.

8. In the view of the Group there is a large potential market for pot plants, particularly for the traditional non-specialist types which are able to stand a fair amount of maltreatment. In general, the public has little knowledge of

how to care for plants and it is not the usual practice among growers to provide instructions which will help the buyer to prolong the life and beauty of his purchase. The problems of transport and marketing, however, hinder the development of the pot plant industry. Costs of transport are rising, pot plants are difficult to stack in lorries, and need special care in handling in wholesale markets, not all of which have adequate facilities for the purpose. Only the smaller growers, who tend to concentrate on the local market selling direct to local retail outlets, have comparatively few marketing problems. Supermarkets in this country have so far shown little interest in this trade although they are the main outlet for pot plant sales in America. One large chain store has recently started selling pot plants in about half a dozen of its stores as a pilot scheme. We understand that their main interest is in good quality attractive presentation and in a quick turnover, as pot plants soon begin to wilt in the hot dry atmosphere of large stores. It is, perhaps, the development of these outlets in this country that offers the greatest potential for significantly increased sales of pot plants.

POINSETTIAS

9. We gave particular attention to the sales of poinsettias as pot plants as there has been a marked increase in their production over the past few years since the introduction of varieties more suitable for winter transport and more tolerant of shop and house conditions. Precise figures for sales are unobtainable, but with the help of major producers we estimate that about 75,000 pots were sold in 1965, 175,000 pots in 1967 and 750,000 pots in 1969. These estimates are approximate because they are based on the production of cuttings, and the relationship of cuttings produced to pots sold is variable, and depends upon the variety and production method employed. Between 75 per cent and 80 per cent of sales are made in the pre-Christmas period. It is thought that the rate of expansion has now slowed down, and that the market may stabilize at a level just below one million pots annually, with at least three-quarters of them grown for the Christmas market.

CARNATIONS

10. At July 1969 carnations (flowers and cuttings) represented 5.6 of the total glasshouse acreage in England and Wales. At January 1970 the proportion was 4.6 per cent reflecting the seasonal variation in the acreage of this crop. Since the 1967 Examination the U.K. carnation acreage has shown only marginal fluctuations, the area in 1966/67 being 175 acres compared with the slightly increased figure of 193 acres at the beginning of 1970. The acreage seems likely to remain fairly stable for some time to come.

11. Although the acreage of carnations grown has not increased to any great extent over the last 15 years, technical developments during the period have contributed to a significant increase in efficiency. The industry now obtains 65-70 flowers per square foot from a two year crop compared with 45 to 50 in 1956. Some businesses now produce cuttings abroad, shipping them, unrooted, back here. Carnation growing is, however, at a climatic disadvantage in this country and, in spite of the employment of up-to-date techniques including closer planting and better irrigation control, growers face competition from expansion of the industry in France and imports from South Africa. In order to maintain production at an economic level, efforts are being made to increase the number of blooms per plant, but it is difficult to achieve this without some loss of quality, particularly in the winter period of low light. The maintenance of good quality is, however, essential if home production is to compete with imports during the winter months.

12. The estimated cropped area of roses grown under glass in the United Kingdom in 1969/70 was 121 acres, only one acre less than that grown in 1966/67. Although the overall size of the industry has remained fairly static more smaller growers have taken to growing roses for cutting, whilst some of the bigger growers in the Lea Valley have sold out or moved to more favourable areas. At January 1970 roses occupied 2.9 per cent of the total glasshouse acreage in England and Wales, the large concentrations being in Essex, Herts and West Sussex.

13. Roses are a specialized crop. They are expensive to lay down, take a considerable time to propagate and are technically demanding. Once established, therefore, growers tend to stay in rose production. Larger holdings, i.e., those with more than two acres of glass, encounter management problems and few growers are prepared to expand their businesses beyond this size. The group noted the considerable demand for mini-roses of the Garnette type in Europe. The demand for roses of this type is limited at present but there is clearly scope for increased sales in this country.

BULBS (INCLUDING BULBS FOR FORCING)

14. The whole of the bulb industry in this country has expanded greatly since the war. Over the years the pattern of the industry has changed; for example, the economics of buying in bulbs for forcing has led to many growers of dry bulbs erecting their own forcing units. In consequence the acreage of bulbs for forcing has increased and has kept broadly in line with the increase in the glasshouse acreage. In January 1967 the acreage in England and Wales was 161.12 (4.2 per cent of the total glasshouse acreage). In January 1970 the proportion of the expanded glasshouse acreage was virtually unchanged, although the actual acreage under bulbs had increased slightly to 173.8 acres. Over half the total acreage is in the county of Lincs (Holland) the bulk of the remainder being in the Eastern Counties.

15. Yields per acre of dry bulbs have risen steadily although prices of both cut flowers and dry bulbs have remained fairly static. Apart from the economics of supply and demand, two factors which limit the scope for further expansion of the industry are the need for wide rotations of this crop to avoid attacks of stem and bulb eelworm and fusarium bulb rot, which affect daffodils and tulips. Nevertheless, it is thought that the industry will expand further to serve the home market, and that there may also be a limited export market for cut flowers. This latter is facilitated by the location of the industry close to the ports on the east coast and the ready availability of shipping to the Continent. Though British grown bulbs are of high quality and compare favourably with those grown in the Netherlands, some difficulties in satisfying importing countries' phytosanitary regulations do arise with exports of dry bulbs. The growers in the south-west, which is relatively free from potato cyst eelworm infestations, have least difficulty in this respect and a modest but promising start has been made in exporting bulbs grown in Cornwall by air to the Continent. Northern Ireland is also exporting small quantities of bulbs, in particular narcissi, to a number of countries, and increasing quantities of bulbs are also being exported from Scotland.

FREESIAS

16. Freesias accounted for only 0.5 per cent (21.71 acres) of the total glasshouse acreage in England and Wales at January 1970. This was approximately three acres less than at January 1967 but within the limits of annual fluctuations in the area of this crop.

17. This is a casual crop popular with small growers in the west country who grow very small areas of freesias. Their production can be expanded or reduced quickly to fit in with their overall economy and their estimate of market requirements. There is a tendency among growers to regard freesias as a cheap flower offering only modest returns and needing comparatively little care. In consequence the home produced crop is often of rather poor quality and cannot compete with the more specialized production from corms practised by Continental growers.

IRISES AND GLADIOLI

18. At June 1969 production in England and Wales of irises and gladioli for cut flowers or bulbs occupied just over 600 acres and 700 acres respectively. Both crops are highly concentrated in Lincs (Holland) and the eastern counties with significant acreages in the south-west. However, very few growers specialize in the production of gladioli and irises. There is a lot of movement in and out of production of these crops although some growers are known to keep irises down for several years, cropping them only if the market is favourable.

DAHLIAS

19. The acreage of dahlias in England and Wales at September 1969 was 996, largely concentrated in the east and south-east. The crop is entirely non-specialist and is grown largely for the production of tubers, there being only a limited demand for dahlias as cut flowers.

THE FLOWER INDUSTRY AS A WHOLE

20. The most urgent problems facing the flower industry today are how to expand public demand for its products and how to cut distribution costs and give the grower a bigger share of the retail price. The transport of a product which is highly perishable and susceptible to damage is a continuing problem.

Publicity and outlets

21. Since the last Examination the flower industry has suffered something of a recession. Modern methods and better techniques have contributed to increased production which has not, however, been matched by increased demand. In consequence the market is at times over supplied and, in spite of their increased efficiency, many growers have failed to increase their profits in real terms. By comparison with the Continent the *per caput* consumption of flowers in this country is very low, and it is clear that the small oversupply here could be absorbed given more and better publicity. A strong and effective publicity campaign is badly needed, and publicity expenditure of something like 1 per cent of turnover would be a more appropriate level than the present very low figure of 0.1 per cent—though we realize that in so far as publicity may be directed towards changing social habits (e.g., by encouraging guests to take flowers to their hostess) lasting results can be hoped for only in the long term.

22. A greater number and variety of outlets would do much to stimulate demand, and we note that there are many fewer casual outlets in this country than is customary on the Continent. There is undoubtedly a large element of impulse buying in flower purchases and the street kiosk, greengrocer and supermarket are all outlets which might be expanded without necessarily offering serious competition to the high class trade of the traditional florist. Indeed, an

expansion of direct trading through such outlets may even improve florists' sales by encouraging the habit of flower buying; and the more casual outlets may offer a market for second quality produce which would otherwise never find a sale. No opportunity for exploring further avenues should be lost. At least one grower has had some success in bunching flowers for sale at a fixed price throughout the season, but varying in content according to market values; and this might be carried further by offering for retail sale bunches of mixed flowers at a fixed price but made up according to current availabilities and prices for the component items.

Distribution costs

23. Market prices, which are largely dictated by the balance of supply and demand, have moved very little over the last 20 years. There have, however, been substantial rises in costs. With the help of better techniques and modern equipment many growers have been able to maintain or even increase their level of profitability by increasing their output per acre. But the momentum gained by this injection of technical skill and up-to-date equipment has now slowed down, and growers are looking critically at their marketing costs for possible economies. The small grower, who is operating outside the areas of high concentration, is often able to shorten the links in the marketing chain and so cut marketing costs by direct sales off the nursery or by using local outlets such as garden centres, local markets and local retailers. In recent years there has been a large increase in farm-gate sales, particularly in Sussex and Cornwall. Some growers are selling through secondary wholesalers. Growers in more concentrated production areas may find it desirable to co-operate in the transport and marketing of their produce—although the present trend appears to be rather towards larger individual organizations than towards co-operative effort which involves the very real problem of grading flowers so that the price can be related to quality. The bigger grower can often supply his own transport, and so ensure careful handling and prompt delivery. The medium-scale grower is at a particular disadvantage, however, operating as he does on too large a scale for his produce to be absorbed locally and yet not on so large a scale as would enable him to provide his own transport to market.

24. It is too early to gauge fully the effect, from the grower's point of view, of the regulations governing the hours of work etc., of transport drivers, but freight charges continue to increase sharply whether by rail or by road, and an analysis by one grower of the number of rail consignments which failed to reach their market on time has illustrated the difficulties which the grower in the more remote parts of the country must overcome if he is to remain in business. It is sometimes suggested that distribution problems might be lessened by a reversal of the trend towards concentration in specialized areas of production, and by more scattered production units close to the main consumption centres. This, however, would be to lose not only the geographical advantages of growing in climatically favourable areas but also the benefits of proximity to ancillary trades. The long term answer to the problems of distribution may well lie in the use of insulated containers, and the development of co-operative transport arrangements with cold stores at assembly points. One large grower-distributor has already used insulated transport successfully. In the shorter term, individual growers might find it possible to alleviate their transport problems by establishing and maintaining close relations with the local transport undertaking, e.g., by encouraging local railway managers to warn them of impending operating difficulties in a particular area in time for consignments to be switched to alternative markets.

Exports

25. Under present conditions it is not easy to sell flowers to Continental countries. One large grower-distributor in this country operates his own export organization and sends produce to the Continent in insulated containers, but individual growers cannot afford to send travellers to the Continent to collect orders. They are obliged to trade through Holland, which operates as a central point within the E.E.C., and are not able to take advantage of the considerable market which exists in West Germany, Switzerland and Sweden for—in particular—carnations, roses, chrysanthemums and freesias. Demand for cut flowers in Western Europe is still increasing and no saturation point is in sight; and as the distance from producer to consumer becomes less important there will be more opportunities for growers with good production techniques and good sales organization. This situation presents export possibilities for growers of flowers under glass in this country and they would be greatly assisted by the establishment of a central clearing house to give a complete export marketing service.

Record of Study by the Hardy Nursery Stock Group

1. The trade in hardy nursery stock covers a wide variety of material much of which is grown and marketed in small consignments. As a consequence it is difficult to obtain reliable figures for output or value of production; and the average figures that are available group the different types of stock under a few broad headings. This comparative shortage of statistical information has not seemed to us a very serious disadvantage for our present purpose for, although hardy nursery stocks cover so wide a range of items, a great many of those items are grown and marketed under very similar conditions, and we have not thought that it would be profitable to study them individually in detail. It is in the field of marketing, rather than in techniques of production, that the chief developments have taken place in recent years, and it is to marketing that we have directed our attention for the most part, although we have taken the opportunity to make some assessment also of the equipment in use on nursery holdings.

2. For this purpose, we have been able to make use of a special questionnaire which was sent to all growers returning any acreage of hardy nursery stock in the June and September 1969 agricultural censuses for England and Wales. The response to this survey was considerably better than that to a similar survey undertaken at the time of the 1967 Examination, and the usable returns covered 32 per cent of the total number of holdings and 52 per cent of the total acreage growing hardy nursery stock at June 1969. Further details of the survey, and of a similar questionnaire issued in Scotland, are given in the Appendix to this report.

3. We have also studied such statistical material as the census returns could provide for the acreage, structure and geographical distribution of the industry in England and Wales. The general picture which emerges from these studies is not markedly different from that which was described in the 1967 Examination.

Total acreage and value of hardy nursery stock

4. In June 1969 there were 15,625 acres on 2,750 holdings under hardy nursery stock in England and Wales, and the value of sales in 1969/70 is estimated to be about £18½–19 million. Scotland had 765 acres of hardy nursery stock.

5. The total HNS acreage in England and Wales had fallen between 1965 and 1968, from 15,100 down to 13,600 acres and it is as yet too early to say whether the recovery in 1969 will prove to be of more than passing significance. Apart from this, however, there has been no very marked change in the geographical distribution or general structure of the industry since the last Examination. In England and Wales, 57 per cent of the total acreage is found on the 5 per cent of holdings which each grow 20 or more acres of hardy nursery stock. At the other end of the scale these proportions are almost exactly reversed, with only 7 per cent of the total acreage on the 55 per cent of holdings with under two acres each of hardy nursery stock. In Scotland 50 per cent of the total acreage is found on 4 per cent of holdings each of which grow 20 acres or more of HNS, while 66 per cent. of the holdings with less than 2 acres each have 12 per cent of the total acreage.

ROSES

6. At June 1969, roses were grown on 973 holdings in England and Wales—over one-third of the holdings growing one or more kinds of hardy nursery stock—and accounted for 4,094 acres, or just over a quarter of the total acreage under hardy nursery stock. In Scotland in 1969 roses were grown on 66 holdings giving a total of 380 acres or approximately 50 per cent of the total hardy nursery stock acreage.

7. Growers rely to a very considerable extent on the importation of rose stocks (see Tables 35 and 36). In 1969, almost 50 million rose stocks were imported into the U.K., at a value of £587,000. The Netherlands were by far the largest supplier, accounting for over 90 per cent of the total import value. Imports from Denmark, although small by comparison with those from the Netherlands, have been rising steadily, and in 1969 accounted for 5 per cent of the total value; and smaller and more fluctuating supplies came from West Germany and Belgium. Since these stocks are bought for growing on, there is a time lag between importation and sale to the public, and any over-supply of maiden bushes resulting from heavy imports of rose stocks would not be detected for two or three years. Some over production has resulted from very marked increase in imports of stocks in the mid-60's, but there has been a decline in imports during the last two years.

8. Continental stocks have no climatic advantage over stock produced in the U.K., and the home production of rose stocks clearly suggests itself as a possible means of saving imports. Experiments in the production of rose stock from seed are being carried out at Luddington Experimental Horticulture Station, and a few English growers are known to be attempting commercial production and others to be experimenting with sowings of seed. In the main, U.K. growers still prefer to concentrate on selling mature bushes and standards rather than to experiment with the production of stock, and are behind many of the continental growers in knowledge of the techniques needed for stock production. Rose rootstock production is likely to remain a specialist line. Further work on systems of production and on suitable herbicides may enable a greater proportion of the industry's rose rootstocks to be grown at home, and a higher and more even rate of germination to be achieved.

9. The Northern Ireland Agricultural Trust, a body established by the Ministry of Agriculture for Northern Ireland, is co-operating with a small number of growers in different parts of Northern Ireland in the production of rose stock on one-third of an acre in each case. The crop is grown according to a technical programme laid down in conjunction with the Ministry of Agriculture for Northern Ireland and other arrangements cover the harvesting, grading and marketing of the crop.

TABLE 35

United Kingdom Imports of Rose Stocks—1965-1969

	1965		1966		1967		1968		1969	
	'000	£000	'000	£000	'000	£000	'000	£000	'000	£000
Rose Stocks:										
Belgium	859	4	1,032	6	596	3	1,560	6	797	5
Netherlands	37,461	414	57,542	594	52,593	557	45,925	588	42,850	533
Germany, West	925	9	1,156	14	508	7	1,391	15	1,845	18
Denmark	575	4	649	6	920	8	2,500	19	3,741	29
Irish Republic	530	4	1,058	9	159	1	355	4	88	1
All other Countries	143	2	113	2	86	2	86	2	91	1
Total	40,493	437	61,550	631	54,862	578	51,817	634	49,412	587

TABLE 36

*United Kingdom imports of hardy nursery stock other than
rose stocks in 1968 and 1969*

Imported from	1968		1969	
	'000	£'000	'000	£'000
<i>Roses (other than rose stocks)</i>				
Netherlands	1,379	100	915	85
France	21	2	230	38
Belgium	490	24	520	25
Hungary	64	4	258	16
Morocco	176	13	—	—
Denmark	51	1	67	3
All other Countries	17	2	37	4
Total	2,198	146	2,027	171
<i>Azalea Indica</i>				
Belgium	1,246	362	1,080	338
Netherlands	112	26	132	30
Germany, East	97	16	13	4
Denmark	—	—	49	6
Germany, West	—	—	44	5
All other Countries	1	1	—	—
Total	1,456	405	1,318	383
<i>Other trees, shrubs and bushes</i>				
Netherlands	21,728	1,441	23,081	1,611
Belgium	5,651	212	6,175	315
Denmark	3,069	140	2,574	143
France	551	23	584	25
Irish Republic	3,096	27	1,308	19
Japan	82	19	76	21
All other Countries	1,258	43	659	32
Total	35,435	1,905	34,457	2,166
<i>Plants not elsewhere specified*</i>				
Netherlands	10,206	334	8,841	303
Italy	6,596	111	7,211	109
Switzerland	1,131	12	5,877	68
France	258	11	3,154	52
Belgium	607	34	264	24
Singapore	2,021	25	3,166	28
Germany, West	394	14	1,738	37
U.S.A.	445	23	180	11
Denmark	214	11	148	20
Irish Republic	469	13	392	14
All other countries	415	13	781	15
Total	22,756	601	31,752	681

* Believed to contain a high proportion of hardy nursery stock.

FRUIT TREES AND BUSHES

10. In June 1969 fruit tree and bush stock was grown on 835 holdings and 2,895 acres in England and Wales, i.e., 30 per cent of the total holdings, and rather less than one-fifth of the total acreage on which hardy nursery stock was grown. The fortunes of this section of the hardy nursery stock industry are of

course closely linked with those of commercial fruit growers, and the market for fruit stock is less buoyant than that for most other types of hardy nursery stock. It is thought that the development of virus-free stock may give some stimulus to sales, both at home and on the export market, although export demands are likely to fall again once virus-free pools have been established in buying countries.

ORNAMENTAL TREES AND SHRUBS

11. These covered 5,604 acres in England and Wales in June 1969 and were grown on 1,271 holdings: 36 per cent of the total acreage and 46 per cent of the total number of holdings for hardy nursery stock. 183 acres were grown on 44 holdings in Scotland. The growing of this type of stock is rather more widespread than that of either roses or fruit stock, and although the main concentrations are to be found in the eastern, south eastern and west midland regions, a quite appreciable proportion of the total lies in the eastern midlands and the south west: just over 400 acres, or 7 per cent of the total, in each of these two regions.

OTHER HARDY NURSERY STOCK

12. No less than 3,033 acres on 1,549 holdings were devoted to the growing of other forms of hardy nursery stock in England and Wales in 1969, according to the June census returns. This is a somewhat surprising total, considering the very small space required for herbaceous and bedding plants and alpines, which are presumably the major items under this general heading; and it seems possible that in making their agricultural returns growers may have given a rather wide interpretation to the heading 'other nursery stock', or have included some of the land temporarily under glass or other crops grown as part of the normal rotation on nursery holdings.

13. The geographical distribution is, as one would expect, rather more general than for either fruit stocks or ornamental trees and shrubs, although the main acreages are still found in south eastern and eastern regions, followed by the south-west and the west midlands.

Demand for hardy nursery stock

14. The shift in public taste away from the more time-consuming aspects of gardening has been reflected in a lower demand from the general public for horticultural seeds and a higher one for most forms of hardy nursery stock. In spite of increased housing densities and the reduced area of private gardens, there is a strong public interest in amateur gardening; and with this and the increased emphasis on public amenity planting and on the landscaping of public developments, the HNS industry is enjoying something of a seller's market at the present time. In these conditions, and with the steady flow of press articles and radio and T.V. programmes on popular gardening, growers have seen no need to engage in deliberate publicity on behalf of the industry as a whole. Individual members of the trade, however, advertise their own stock very widely in the gardening press and daily newspapers, and some of them make certain products (notably varieties of roses) the subject of special intensive sales promotion campaigns.

Wholesale and retail outlets

15. The survey undertaken at the Group's request indicated that almost 60 per cent of the HNS sales are by retail and almost 40 per cent by wholesale with only a very small proportion of produce finding export or other outlets. In money terms, retail sales are estimated to have accounted for £9.5

million in 1968/69, wholesale sales for £6.1 million, exports for £0.1 million and other sales for £0.6 million. In considering these figures it is necessary to make allowances for possible double counting (e.g., where items are bought by one grower from another either for direct sale or for growing on), but we believe that they can be taken as a reasonably accurate guide to the relative importance of these main outlets.

16. Sales through supermarkets and department stores are encouraged by the public's growing familiarity with pre-packaged goods of every description and the suitability of roses and other hardy nursery stock for this type of packaging. At the other end of the distribution chain are garden centres operated by or in close association with growers. Of the 875 holdings which took part in the HNS survey, 51 per cent had their own garden centres for the sale of their produce.

17. Many forms of hardy nursery stock are crops of a distinctly long-term nature, compared with most farm and vegetable crops, and this makes it difficult for the industry to respond rapidly to changes in demand. Growers of trees and shrubs in particular are dependent on their own estimates of what market requirements will be in four or five years' time, and have made efforts to promote contract growing for their sales to local authorities and other substantial purchasers. It is hoped that, for their part, local authorities and other public bodies will continue with their efforts to forecast their future requirements for plant material although it is recognized that they themselves experience considerable difficulties in keeping to their forecasts for the timing of planned development and expenditure.

Container sales

18. The estimated value of sales of container-grown produce during the summer months (May to September inclusive) was £1½ million in 1969, compared with under £1 million in 1968. These estimates are based on the HNS survey carried out for the Group. Results of the survey illustrate the importance of such sales to the smaller holdings in particular, with consumer sales of container grown produce accounting for one-fifth of the total annual sales of holdings of one quarter to three-quarters of an acre and nearly 18 per cent of total sales for 1-2½ acre holdings, although they amount to only 6-7 per cent of total sales from all holdings taken together. The survey also suggests that the number of holdings producing container grown plants for retail sale is almost twice as great as the number of holdings producing them for sale within the trade.

Sales of semi-mature trees

19. This comparatively recent development is perhaps worth special mention, in view of local authorities' increasing interest in it. Authorities find that young stock are so vulnerable to the risk of vandalism that it is often worth their while to pay the higher purchase price and transport charges for semi-mature trees.

Bought-in produce

20. According to the HNS survey, growers spent some £3½ million on bought-in produce in 1968/69, of which £2½ million was for plants for re-sale in the same season and £1½ million for stock for growing on. Almost three-quarters of the produce brought in for re-sale in the same season came from U.K. growers and only 28 per cent was imported; but of the produce bought for growing-on, over four-fifths was imported. A large part of the imported produce bought for growing-on consisted of rose stocks which as already noted were valued at almost £600,000 in 1969.

Marketing organization and export possibilities

21. Although this country is well suited climatically to the production of hardy nursery stock, there is a considerable importation of nursery stock that could quite well be grown within the U.K. The dispersed nature of the U.K. industry has not favoured co-operative marketing organization in the past, although it is beginning to arouse greater interest and certain groups of growers, by no means always on neighbouring holdings, have found it possible to establish joint marketing ventures in recent years. There has been little stimulus in the past towards the sort of aggressive selling and closely integrated sales organization which has been developed in the Netherlands, to the great advantage of Dutch exporters. Dutch growers' ability to offer price inducements is diminishing with the increase in the cost of transport from the Continent. Many British buyers still find it more convenient, however, to order from Dutch salesmen, who can offer a wide range of produce, since they are selling on behalf of large numbers of growers, than to place separate orders with a number of U.K. growers none of whom can supply the complete range of stock required. Opinions are divided about the merits of establishing a clearing house for the location of nursery stock in this country; but lists of growers are being collected within the industry, in the hope of introducing some form of national stock control.

22. The many small growers in the hardy nursery stock sector cannot individually take advantage of overseas markets; and export possibilities have been explored by only a few of the larger enterprises. The industry would benefit considerably from the formation of a national marketing organization which could seek out particular markets overseas through the employment of selling agents operating on similar lines to those used by Dutch salesmen in this country.

23. The varied and often complex plant health regulations imposed by different countries constitute a barrier to trade in nursery stock, not only by reason of the technical requirements they impose but also because of the considerable time and trouble which is involved in studying and complying with the regulations.

Equipment of holdings

24. The following table shows what proportion of the 875 holdings in England and Wales taking part in the HNS survey possessed various types of equipment:

					<i>Per cent</i>
Spraying equipment for insecticides and fungicides	...	...	...	...	69
Spraying equipment for herbicides	...	...	...	...	54
Irrigation equipment	...	...	...	...	47
Soil sterilization equipment	...	...	...	...	37
Mist propagation equipment	...	...	...	...	26
Soil, manure or compost mixers	...	...	...	...	26
Planting machines	...	...	...	...	25
Lifting equipment	...	...	...	...	22
Furrow drawers	...	...	...	...	13
Bundling, tying and wiring equipment	...	...	...	...	7
Nick cutters	...	...	...	...	5
Potting machines	...	...	...	...	4
Defoliating machines	...	...	...	...	1
Plant pot washers	...	...	...	...	1
Insulated stores	...	...	...	...	4
Temperature controlled stores	...	...	...	...	4

25. Not all growers, of course, have a use for every type of equipment, nor are all holdings large enough to justify the expense of full mechanization. It does however seem to us—as it did to the group concerned with the 1967 Examination—that there are still very many holdings that could benefit from further investment in plant and equipment. The comparative dearth of equipment on many holdings is particularly striking in view of growers' complaints of a shortage of skilled and semi-skilled labour in industry. Careers advisers so often seem to have insufficient information about the horticultural industry and the opportunities it can offer as a starting point for careers in such allied fields as landscape gardening, horticultural science and horticultural salesmanship, as well as within its own more particular confines. As a result very few young people find their way into small nursery enterprises, although some of the larger firms have their own training organization and employ a large proportion of young staff.

Appendix

HARDY NURSERY STOCK SURVEY—ENGLAND AND WALES

1. At a meeting on 14 August 1969 between representatives of the National Farmers Union, the Horticultural Trades Association and the Ministry of Agriculture, Fisheries and Food, it was decided to hold a further survey of growers of Hardy Nursery Stock. A questionnaire, simpler than that used for the 1967 enquiry, was devised in the hope that this would result in a better response being obtained than was the case in 1967, and that as a consequence it would be possible to derive more reliable estimates from the data collected.

2. Arrangements were subsequently made for the Ministry's Census Branch to send the enquiry to all growers returning HNS acreages at June 1969 plus others showing HNS acreages at September but not at June. In total 3,469 forms were despatched, 2,750 relating to June, 719 to September: in terms of acreage though, the September contribution was small as details given later will show.

3. It has been necessary to treat the June and September based groups separately. Statistical raising of the returns to cover non-respondents has been possible for June based respondents but has not proved practicable for the September group in view of the inadequacy of the data received.

Survey coverage

June based returns

4. 1,339 of the 2,750 June based forms were returned but only 875 showed values of sales. Inspection of the remainder revealed that some growers had no sales but that many were simply unable or unwilling to answer these questions. The 1,339 may be summarized as follows:

	No. of Holdings	June	June	June
(a) Complete returns	875	Per cent 32	Acreage 8,140½	Per cent 52
(b) Incomplete returns which should have had values	192	7	690½	4
(c) True Nils (Holdings apparently with H.N.S. but which made no sales)	76	3	319½	2
(d) Other Nils (probably not H.N.S. holdings at all)	196	7	250½	2
(e) Total returns	1,339	49	9,400½	60
(f) Total at June	2,750		15,625	

5. The coverage, although better than in 1967 when usable returns covered only 11 per cent of the holdings and 39 per cent of the area, does mean that grossing up to provide England and Wales estimates can be subject to considerable error. Nevertheless, the June based figures have been raised on a size group basis to account for incomplete returns, and then for the non-respondents. It has been assumed that the 'True Nils' represent acreages used for growers' own stock replacement programmes (e.g., orchard replacement which strictly speaking should be valued) and hardy survey stock being grown on for sale several seasons hence.

September based returns

6. 300 of the 719 September based forms were returned and have been sorted out in the same way as those for June (para. 4).

	No. of Holdings	Total eligible September	September	Total eligible September
(a) Complete returns	74	Per cent 10	Acreage 105.75	Per cent 5
(b) Incomplete returns which should have had values	13	2	21.75	1
(c) True Nils (Holdings apparently with H.N.S. but which made no sales)	13	2	19.25	1
(d) Other Nils (probably not H.N.S. Holdings at all)	200	28	429.50	21
(e) Total returns	300	42	576.25	28
(f) September based Total	719		20.33	

Raised results

June based returns

7. An analysis of raised sales values is contained in Table 37. The values per acre, based on the June 1969 acreage and including all the Nils, range from £665, the largest size group, to £1,333 in the 3 to 4½ acre group with an overall average of £1,044. It is not unreasonable to assume, however, that growers asked in January 1970 to provide information on sales in their last complete accounting year would generally have provided figures in respect of the year ending March 1969. In consequence it might be more realistic to relate the total value of sales to the June 1968 total HNS acreage of 13,600 giving an overall average value per acre of £1,199. This valuation is in good agreement with views expressed by grower members of the HNS group. In general terms the usual distribution pattern obtains in that the three smallest size groups containing 2,196 of the 2,750 holdings (80 per cent) have only 3,067 of the 15,625 acres (20 per cent) with a value of £3.5 million of the £16.3 million sales (22 per cent). At the other end of the scale there are 53 holdings (2 per cent) with 39 per cent of the acreage but with rather a smaller share (33 per cent) of the total value, the value/acre of the 100 acre and over group being particularly low. In terms of outlets, with one exception each size group obtained between half and three quarters of its total value from retail sales with most of the balance coming from wholesale sales. Exports were invariably the smallest outlet.

September based returns

8. Inspection of the completed forms revealed that growers returning hardy nursery stocks at September only, generally had small areas under cultivation (mostly under three acres). It was not practicable to raise the September data (Table 38) on a size group basis as had been the case for June based data, but this in itself is no great drawback in view of the relatively small total value of sales from the September group. What is more difficult to explain, however, is the low sales value per acre achieved by these growers—results indicate about £537 compared with £1,044 per acre from the June data. Further examination of the returns has been undertaken but a precise assessment cannot be made in view of the paucity of the data. On the evidence available, however, it is unlikely that the total value of sales for this group would exceed £½m.

Total sales

9. From the data available the total value of sales in England and Wales appears provisionally to be of the order of £16½/17m. and it is thought likely that this relates to the financial year 1968/69. The value per acre varies according to which acreage is accepted. Inevitably there will always be growers who mistakenly return hardy nursery stock crops which would be more appropriate to a flowers return, but if June is taken as a basis the value would be approximately £1,050 per acre without taking into account the cost of bought in produce.

Container grown plant sales

10. The data contained in Table 37 demonstrate that, except in the largest size group, the value of sales of container grown plants increased between 1968 and 1969. A direct comparison with total value is not possible because of the period taken but these summer sales appear to account for something like 6 per cent or 7 per cent of the annual total of all HNS. Further inspection shows that in terms of value/acre they are far more important to the 0.25-0.75 acre size group than any other and it is in this group that the greatest increase per acre occurred.

Value of bought-in produce

11. Around £2½ million worth of stock was bought for resale in the same season and about £1¼ million for growing on. Nearly three quarters of the value of items for resale related to home grown but less than a fifth of that for growing on. It can be seen from Table 37 that the smallest size groups spend the most per acre and the largest group the least but otherwise it is difficult to discern any correlation between group size and expenditure. The smallest size group is alone in buying more for growing on from home sources than from abroad. This refers, however, only to direct purchases by the grower, and many small growers in particular buy from U.K. wholesalers, whose own stock may be largely imported.

Business information and equipment

12. The data contained in Table 39 under this head have been limited to those June related returns giving HNS values. It is thought these will give a sufficient guide to the relative importance of equipment and facilities available. Taking the main headings it can be seen that about half of the growers have their own garden centres and this is fairly general throughout the size groups. It is interesting, however, to note that the smallest size group emerges as having the highest percentage and the largest size group the lowest. In contrast, the percentage of growers engaged in producing container grown plants for sale increases with size of holding, with more producing for retail than for sale within the trade except for the two largest size groups. This pattern was repeated in terms of usage of the Horticulture Improvement Scheme.

13. Only a very small number of holdings had invested in either temperature controlled stores or insulated stores, the combined total capacity being 347,000 cubic feet and 326,000 cubic feet respectively.

14. Insecticide and fungicide spraying equipment was most widely used, about 70 per cent of all growers using this equipment.

TABLE 37. HARDY NURSERY STOCK, SIZE GROUPS (ACRES), ENGLAND AND WALES AT JUNE 1969

	0.25-0.75		1.0-2.75		3.0-4.75		5.0-9.75		10.0-19.75		20.0-29.75		30.0-49.75		50.0-99.75		100 & over		Total	
	Value	Per cent	Value	Per cent	Value	Per cent	Value	Per cent	Value	Per cent	Value	Per cent	Value	Per cent	Value	Per cent	Value	Per cent	Value	Per cent
Retail sales (£'000)	358.2	72	997.9	75	856.8	50	1,497.1	69	1,090.0	55	861.1	59	942.9	46	1,492.2	54	1,356.6		9,452.8	58
Wholesale sales (£'000)	128.3	26	306.4	23	807.1	47	583.8	27	823.9	42	501.6	34	985.2	48	1,148.6	42	814.7		6,099.6	37
Export sales (£'000)	0.4	..	5.4	..	3.3	..	26.5	1	4.9	..	4.8	..	16.4	1	14.2	1	32.3		108.1	1
Other sales (£'000)	10.0	2	17.1	1	35.2	2	62.1	3	57.2	3	90.0	6	87.4	4	106.3	4	184.3		649.6	4
Total value (£'000)	496.9	100	1,326.8	100	1,702.3	100	2,169.4	100	1,976.0	100	1,457.5	100	2,032.0	100	2,761.3	100	2,387.9		16,310.1	100
June acreage	377		1,413		1,277		1,730		1,912		1,168		1,654		2,503		3,591		15,825	
Total value per acre (£)	1,318		939		1,333		1,254		1,033		1,248		1,229		1,103		665		1,044	
Number of holdings	937		912		347		263		146		49		43		36		17		2,750	
Value of container grown plants sold between 1.5.68-30.9.68 (£'000)	66.1		185.7		110.5		116.2		116.2		76.4		82.6		129.4		74.4		957.5	
1.5.69-30.9.69 (£'000)	100.4		241.6		160.3		155.3		154.3		119.0		95.2		161.2		65.0		1,252.4	
1.5.68-30.9.68 (£/acre)	175		131		87		67		61		65		50		52		21		61	
1.5.69-30.9.69 (£/acre)	266		171		126		90		81		102		58		64		18		80	
Cost of bought in produce																				
For resale in same season	106.5		204.7		215.0		275.2		231.6		110.2		146.3		412.2		126.6		1,828.4	
From U.K. (£'000)	81.2		100.3		81.2		131.0		120.7		40.2		64.3		104.1		27.3		721.5	
From overseas (£'000)	18.5		41.1		29.1		32.6		30.3		24.5		12.5		16.2		24.4		229.2	
For growing on	10.5		71.9		91.2		135.6		156.2		87.6		167.1		148.0		128.5		996.5	
From overseas (£'000)	187.9		418.0		416.5		574.4		538.8		262.5		390.2		680.5		306.8		3,775.6	
Total (£'000)	498		296		326		332		282		225		236		272		85		242	

Note: Minor differences due to rounding.

TABLE 38

*Hardy Nursery Stock—Unraised results at September, 1969
England and Wales*

	<i>Value</i>	<i>Per cent</i>
Retail sales (£'000)	31.1	55
Wholesale sales (£'000)	24.8	44
Export sales (£'000)	—	...
Other sales (£'000)	0.9	2
Total value (£'000)	56.8	100
September acreage	105.75	
Total value per acre (£)	537	
Number of Holdings	72	

Value of container grown plants sold between

1.5.68—30.9.68 (£'000)	3.3
1.5.69—30.9.69 (£'000)	4.9
1.5.68—30.9.68 (£/acre)	31
1.5.69—30.9.69 (£/acre)	46

Cost of Bought-in Produce

For resale in	from U.K. (£'000)	6.3
same Season	from Overseas (£'000)	3.9
for growing	from U.K. (£'000)	1.4
on	from Overseas (£'000)	4.1
Total (£'000)		15.7
(£/acre)		148

Note: Minor differences due to rounding.

*Hardy Nursery Stock Distribution of Holdings by Size Groups at June, 1969; other Details at January, 1970
England and Wales*

Hardy Nursery Stock Size Groups (Acres) at June 1969

Returns for which June Acreages are available		0.25-0.75	1.0-2.75	3.0-4.75	5.0-9.75	10.0-19.75	20.0-29.75	30.0-49.75	50.0-99.75	100.0 and over	Total
<i>Group 4 Acceptable Returns</i>		218	257	141	108	70	558.25	937.50	1,713.50	2,284.25	8,140.50
Holdings		93.50	421.25	524.00	699.50	908.75					
June acreage											
Holdings selling through their own Garden Centre.		(55%) 119	(54%) 139	(49%) 69	(45%) 49	(45%) 32	(48%) 11	(50%) 12	(35%) 8	(27%) 3	(51%) 442
Holdings producing container the trade		99	118	72	59	38	12	12	15	8	433
grown plants for sale.											
		(11%) 25	(20%) 52	(21%) 29	(30%) 32	(30%) 21	(30%) 7	(38%) 9	(39%) 9	(63%) 4	(22%) 191
		193	205	112	76	49	16	15	14	4	684
		(30%) 65	(39%) 101	(39%) 55	(45%) 34	(49%) 34	(48%) 11	(50%) 12	(39%) 9	(55%) 6	(39%) 342
		153	156	86	59	36	12	12	14	5	533
Holdings owning an insulated store		2	4	5	5	8	4	6	3	Nil	37
		4,850	20,160	55,364	44,704	67,200	51,500	46,105	35,950	Nil	325,833
		216	253	136	103	62	19	18	20	11	838
Holdings owning a temperature controlled store.		5	3	7	35,568	7	2	3	3	2	37
		18,300	7,200	51,624	103	51,940	5,350	74,408	31,963	70,700	347,053
		213	254	134	103	63	21	21	20	9	838
Holdings having made use of Horticulture Improvement Scheme Grants.		(32%) 70	(42%) 108	(54%) 76	(58%) 63	(71%) 50	(78%) 18	(96%) 23	(91%) 21	(91%) 10	(50%) 439
		148	149	65	45	20	5	1	2	1	436
Soil sterilization equipment		90	96	53	32	22	8	9	6	5	321
Furrow drawers		50	61	41	26	18	11	10	9	4	230
Nick cutters		18	29	13	18	11	4	10	4	4	115
Planting machines		1	5	3	5	5	4	11	3	3	41
Irrigation equipment		16	36	27	44	34	17	19	14	6	219
Mist propagation equipment		94	113	69	51	31	14	19	17	8	411
Equipment { insecticides, fungicides		32	53	41	33	26	13	17	20	10	231
Equipment { herbicides		126	159	103	81	60	21	24	20	8	604
Defoliating machines		79	129	77	65	51	21	23	21	8	474
Lifting equipment		Nil	1	1	1	2	2	2	3	1	13
Bundling, tying and wiring equipment		6	21	32	34	30	16	23	20	10	192
Plant pot washers		4	6	9	8	11	8	7	6	3	62
Potting machines		2	1	Nil	2	1	2	2	2	Nil	12
		4	13	2	7	4	1	3	3	2	38

Questionnaire

This questionnaire relates only to the nursery stock of fruit trees, roses and other ornamental trees and shrubs, herbaceous plants and alpiners. Please *exclude* from your answers, to the best of your ability, any part of your business which concerns forest or Christmas trees, bedding plants, the nursery stock of edible produce (e.g., cabbage or tomato plants), dead stock (e.g., wheelbarrows or garden ornaments), or plantations for commercial fruit production.

Please give the answers to questions 2 to 12 to the nearest £.

	acres
Area devoted to hardy nursery stock	1

	(please tick as appropriate)	Yes	No
Do you sell through your own garden centre?	13		

VALUE OF ALL SALES OF HARDY NURSERY STOCK IN LATEST COMPLETED ACCOUNTING YEAR

	£
Retail, including those made by landscape departments	2
Wholesale, to retail outlets and within the trade	3
For export	4
Other	5
TOTAL VALUE	6

	Yes	No
Do you produce container grown plants for sale.		
within the trade	14	
retail	15	

	Yes	No
Do you own		
an insulated store	16	
if "yes" please state capacity—cu. ft.	17	
a temperature controlled store	18	
if "yes" please state capacity—cu. ft.	19	

VALUE OF SALES OF CONTAINER GROWN PLANTS ONLY

	£
Sold between 1st May and 30th September	
1968	7
1969	8

	Yes	No
Have you at any time made use of Horticulture Improvement Scheme grants	20	

COST OF BOUGHT-IN PRODUCE

	£
For resale in same season	
From U.K.	9
From overseas	10
For growing on	
From U.K.	11
From overseas	12

EQUIPMENT USED IN NURSERY ENTERPRISE

(please tick if appropriate)

Soil sterilisation equipment	21	
Soil, manure or compost mixers	22	
Furrow drawer	23	
Nick cutter	24	
Planting machine	25	
Irrigation equipment	26	
Mist propagation equipment	27	
Spraying equipment		
{ insecticides, fungicides	28	
{ herbicides	29	
Defoliating machine	30	
Lifting equipment	31	
Bundling, tying and wiring equipment	32	
Plant pot washer	33	
Potting machine	34	

HARDY NURSERY STOCK SURVEY—SCOTLAND

1. The Department of Agriculture and Fisheries for Scotland used a similar survey form to that devised by the Ministry of Agriculture, Fisheries and Food.

2. The Economics and Statistics Unit of the Department identified Scottish Hardy Nursery Stock growers from records held for the June 1969 census and, on completion of the survey, raised results to allow for non-response, etc. Responsibility for conducting the enquiry rested with the Administrative Branches concerned.

Survey coverage

3. The Scottish Survey was centred solely on June based returns.

4. 153 enquiry forms were issued accounting for all the June 1969 Hardy Nursery Stock acreage of 764½ acres. 64 returns were sent back, i.e., less than 50 per cent of the number issued; 17 of these returns implied they did not grow Hardy Nursery Stock, which was in direct conflict with the entries made on their June ARs, while two were unwilling to take part in the survey and hence were treated as non-responders. This left 45 returns representing 29 per cent of the number issued but accounting for 442½ of the June acreage (58 per cent).

Raised results

5. Because of the relatively small number of Scottish Hardy Nursery Stock growers and the low response rate to the survey, it was not possible to raise the survey results by size group. Raised universe results are contained in Tables 40–41.

Total sales

6. From the data available the total value of sales in Scotland appears to be of the order of £1 million to £1½ million. The value per acre varies according to whether the June acreage or the survey acreage is accepted as the accurate figure: taking the former, the value would be approximately £1,580 per acre without taking into account the cost of bought-in produce. Compared with England and Wales, retail sales in Scotland are relatively more important, accounting for 88 per cent of the total.

Container grown plant sales

7. As in England and Wales, the Scottish value of sales of container grown plants increased between 1968 and 1969.

Values of bought-in produce

8. Around £160,000 of stock was bought for re-sale in the same season and about one quarter of that sum was additionally spent on produce for growing on.

Business information and equipment

9. The proportion of growers having their own garden centres is similar to that of England and Wales, i.e., approximately half, but the proportion who have made use of the Horticulture Improvement Scheme grants appears to be slightly lower than south of the border. Insecticide and fungicide spraying, herbicide spraying and soil sterilization are the most widely held types of equipment.

TABLE 40

*Hardy Nursery Stock—Raised results at June, 1969**Scotland*

	Value	Per cent.
Retail sales (£'000)	1,066	88
Wholesale sales (£'000)	135	11
Export sales (£'000)	6	1
Other sales (£'000)	1	—
Total value (£'000)	1,208	100
June acreage	764½	
Total value per acre (£s)	1,580	
Number of Holdings	153	
Value of Container Grown Plants sold between		
1.5.68—30.9.68 (£'000)	53	
1.5.69—30.9.69 (£'000)	95	
1.5.68—30.9.68 (£/acre)	69	
1.5.69—30.9.69 (£/acre)	124	
Cost of bought-in produce		
For resale in same season		
From U.K. (£'000)	103	
From Overseas (£'000)	62	
For growing on		
From U.K. (£'000)	9	
From Overseas (£'000)	31	
Total (£'000)	205	
(£/acre)	268	

TABLE 41

Hardy Nursery Stock—Based on acreage at June, 1970

		TOTAL	
<i>Acceptable Returns:</i>			
Holdings			45
June Acreage			442½
Holdings selling through their own Garden Centre	Yes (Numbers) No (Numbers)	(71 %)	32 13
Holdings producing container grown plants for sale:			
Within the Trade	Yes (Numbers) No (Numbers)	(18 %)	8 37
Retail	Yes (Numbers) No (Numbers)	(38 %)	17 28
Holdings owning an Insulated Store	Yes (Numbers) Capacity (cu. ft.) No (Numbers)		4 4,200 41
Holdings owning a temperature controlled store	Yes (Numbers) Capacity (cu. ft.) No (Numbers)		2 3,600 43
Holdings having made use of Horticulture Improvement Scheme Grants	Yes (Numbers) No (Numbers)	(51 %)	23 22
Holdings using:			
Soil sterilisation equipment	Numbers		23
Soil manure or compost mixers	Numbers		13
Furrow drawers	Numbers		9
Nick cutters	Numbers		3
Planting machines	Numbers		18
Irrigation equipment	Numbers		15
Mist propagation equipment	Numbers		15
Spraying equipment:			
Insecticides and fungicides	Numbers		33
Herbicides	Numbers		28
Defoliating machines	Numbers		1
Lifting equipment	Numbers		10
Bundling, tying and wiring equipment	Numbers		5
Plant pot washers	Numbers		—
Potting machines	Numbers		3

Appendix I

ACREAGES

Average annual cropped areas of vegetables, fruit and non-edibles

Vegetables (U.K.) (b)	Average cropped area, acres (a)			
	1956/57 to 1960/61	1960/61 to 1964/65	1964/65 to 1968/69	1969/70 (Provisional)
<i>In the open</i>				
Asparagus	1,430	1,505	1,197	996
Beans, broad	9,901	11,620	9,922	7,927
Beans, runner and French	13,106	15,369	18,992	26,248
Beetroot	9,566	8,738	8,073	8,748
Brussels sprouts	46,080	47,990	43,877	49,191
Cabbage, kale etc.	75,799	71,623	62,934	74,286
Carrots	32,377	31,804	29,422	43,290
Cauliflower	39,616	44,347	43,139	41,185
Celery	5,759	6,044	5,444	5,329
Leeks	1,917	2,085	2,333	3,028
Lettuce	14,993	15,724	16,288	18,241
Onions, dry bulb	2,889	3,156	5,566	7,096
Onions, green	3,105	3,478	3,641	3,382
Parsnips	4,432	4,722	5,078	6,663
Peas, green for market	32,968	27,377	18,268	15,419
Peas, green for processing . .	61,353	76,990	90,641	112,974
Rhubarb	5,750	5,566	4,428	3,541
Turnips and swedes	12,345	9,488	9,829	11,272
Watercress	647	590	514	470
Others	92,034	48,916	53,855	70,516
Total, vegetables in the open(b)	466,067	437,132	433,441	509,802
<i>Under glass and in sheds</i>				
Cucumbers	458	448	394	368
Lettuce	1,440	1,406	1,662	1,986
Mushrooms	399	639	777	828
Tomatoes	2,681	2,329	2,240	2,305
Other vegetables	443	392	435	536
Total, vegetables under glass	5,422	5,214	5,508	6,023
Total, vegetables(b)	471,489	442,347	438,949	515,825
Fruit (U.K.)	1956/57 to 1960/61	1960/61 to 1964/65	1964/65 to 1968/69	1969/70
			(Provisional)	(Provisional)
<i>Orchard fruit</i>				
Apples, dessert	65,176	63,211	58,973(c)	58,640(c)
Apples, cooking	62,987	52,366	43,264(c)	40,358(c)
Apples, cider	41,173	33,046	26,342(c)	25,528(c)
Pears, perry				
Cherries	16,486	13,358	9,897(c)	8,314(c)
Pears	17,606	16,780	15,523(c)	15,417(c)
Plums	31,310	24,836	20,239(c)	18,578(c)
Others and mixed	3,363	3,216	3,169(c)	2,828(c)
Total, orchard fruit	238,101	206,813	177,407(c)	169,663(c)

Fruit (U.K.)	1956/57 to 1960/61	1960/61 to 1964/65	1964/65 to 1968/69	1969/70 (Provisional)
<i>Soft fruit</i>				
Blackcurrants	12,451	15,456	12,971	11,431
Gooseberries	5,872	5,781	5,046	4,286
Raspberries	10,375	8,767	8,482	9,090
Strawberries	18,336	17,006	17,767	17,804
Blackberries	} 2,679	2,471	2,215	1,771
Currants, red and white				
Loganberries				
Others and mixed				
Total, soft fruit	49,713	49,481	46,481	44,382
Total fruit	287,814	256,294	223,888(c)	214,045(c)

Bulbs, Flowers and Nursery Stock (England and Wales)	Average area, acres(d)			
	1956/57 to 1960/61	1960/61 to 1964/65	1964/65 to 1968/69	1969/70 (Provisional)
<i>In the open</i>				
Bulbs for bulbs	3,784	5,237	} 13,390	14,699
Bulbs for flowers	6,601	7,442		4,280
All other flowers in the open	6,590	5,848		
Total	16,975	18,527	18,763	18,979
<i>Hardy nursery stock</i>				
Fruit trees, stock, etc. . . .	3,893	3,932	4,144(e)	2,895
Roses	} 5,348	6,220	3,832(e)	4,094
Ornamental trees and shrubs			5,038(e)	5,604
Other nursery stock (Alpines and herbaceous plants)			2,169(e)	3,033
Total	12,994	13,731	15,183(e)	15,626
<i>Under glass (selected items)</i>				
Carnations	193	209	219	230
Chrysanthemums (total grown in autumn and winter)	681	724	755	702
Freelias	(f)	(f)	25	21
Pot plants (excluding Chrysanthemums)	(f)	163(g)	196	222
Bulbs for forcing	173(h)	177	170	171

- Notes*
- (a) Based on one or more censuses, with allowances for double cropping, failures, etc.
- (b) Excluding potatoes.
- (c) Subject to adjustment in the light of the results of the 1970 Orchard Fruit Census.
- (d) Census data.
- (e) Average of two years 1967 and 1968 only and in total not agreeing with the five year average given in Table 1.
- (f) Not available.
- (g) Average of four years 1961, 1962, 1963 and 1964.
- (h) Average of four years 1958, 1959, 1960 and 1961.

Appendix II

OUTPUT

Average annual outputs of vegetables and fruit

Vegetables (U.K.)(a)	Average output '000 tons			
	1956/57 to 1960/61	1960/61 to 1964/65	1964/65 to 1968/69	1969/70 (Provisional)
<i>In the open</i>				
Asparagus	1.3	1.2	1.0	0.6
Beans, broad	28.7	39.9	39.5	32.1
Beans, runner and French	51.4	57.1	70.7	102.3
Beetroot	91.1	93.9	96.9	105.8
Brussels sprouts	148.4	157.5	174.8	193.2
Cabbage, kale, etc.	532.0	535.8	567.7	662.7
Carrots	309.1	322.8	369.1	540.2
Cauliflower	221.9	253.3	314.8	274.7
Celery	87.6	94.2	71.9	62.9
Leeks	17.4	18.7	21.4	26.1
Lettuce	76.1	100.1	110.8	109.3
Onions, dry bulb	23.8	38.5	62.3	88.3
Onions, green	15.9	17.7	19.7	17.7
Parsnips	37.5	40.3	44.4	51.2
Peas, green for market	78.3	88.4	59.1	47.6
Peas, green for processing	84.9	130.6	161.0	190.3
Rhubarb	34.5	41.8	47.3	41.4
Turnips and swedes	129.1	132.0	132.5	144.6
Watercress	7.3	5.8	6.5	6.0
Others	163.0	135.5	142.8	154.7
<i>Under glass and in sheds</i>				
Cucumbers	33.6	31.9	30.5	29.8
Lettuce	10.3	10.1	12.3	15.2
Mushrooms	11.6	19.5	29.2	36.4
Tomatoes	92.3	81.5	80.7	91.3
Other vegetables	4.2	3.9	4.6	6.0
Fruit (U.K.)	Average output '000 tons			
	1956/57 to 1960/61	1960/61 to 1964/65	1964/65 to 1968/69	1969/70 (Provisional)
<i>Orchard fruit</i>				
Apples, dessert	224.7	245.1	222.2(b)	260.9(b)
Apples, cooking	259.8	213.2	169.8(b)	144.2(b)
Apples, cider	} 76.4	63.3	40.6(b)	26.2(b)
Pears, perry				
Cherries	21.5	17.3	6.8(b)	10.6(b)
Pears	60.2	57.5	50.2(b)	58.2(b)
Plums	69.4	62.2	41.5(b)	56.2(b)
Others and mixed	3.9	3.6	3.2(b)	2.6(b)
<i>Soft fruit</i>				
Blackcurrants	16.6	23.8	18.6	24.2
Gooseberries	13.7	13.5	11.5	12.7
Raspberries	17.6	14.1	13.3	18.3
Strawberries	29.2	34.7	40.6	53.1
Blackberries	} 4.5	4.3	4.0	4.6
Currants, red and white				
Loganberries				
Others and mixed				

Notes

(a) Excluding potatoes.

(b) Subject to adjustment in the light of the results of the 1970 Orchard Fruit Census.

Appendix III

CONCENTRATION

Areas where in 1970 certain crops were concentrated or where significant changes had occurred (a)

Crop	1967		1970	
	Acres	Per cent	Acres	Per cent
VEGETABLES				
All vegetables in the open (excluding potatoes)				
England and Wales	387,647	100	487,375	100
of which Bedford	20,008	5	21,780	4
Cambridge and Ely	21,519	6	27,128	6
Essex and G.L. (part)	17,999	5	25,824	5
Kent	18,513	5	23,354	5
Lincs. (Holland)	41,902	11	52,902	11
Lincs. (Lindsey)	51,024	13	60,945	13
Norfolk	57,719	15	72,304	15
Suffolk	20,697	5	31,386	6
Yorks. (W.R.)	20,323	5	23,578	5
<i>Asparagus</i>				
England and Wales	1,167	100	1,091	100
of which Norfolk	356	31	307	28
Suffolk	374	32	325	30
Worcs.	197	17	143	13
<i>Beans, runner and French</i>				
England and Wales	19,779	100	25,659	100
of which Bedford	1,240	6	1,211	5
Essex and G.L. (part)	1,860	9	2,077	8
Kent	2,052	10	2,059	8
Lincs. (Holland)	1,046	5	1,742	7
Lincs. (Lindsey)	640	3	1,891	7
Norfolk	4,334	22	6,434	25
Suffolk	2,490	13	2,382	9
Worcs.	1,510	8	1,552	6
<i>Beetroot</i>				
England and Wales	8,244	100	7,679	100
of which Bedford	800	10	571	7
Cambridge and Ely	544	7	613	8
Essex and G.L. (part)	305	4	299	4
Kent	417	5	319	4
Lancs.	624	8	540	7
Lincs. (Lindsey)	1,737	21	1,740	23
Norfolk	438	5	430	6
Yorks. (E. and W.R.)	1,078	13	894	11
<i>Brussels sprouts</i>				
England and Wales	42,957	100	52,016	100
of which Bedford	11,537	27	11,500	22
Gloucester	1,821	4	1,680	3
Lancs.	2,068	5	2,876	6
Lincs. (Holland)	1,896	4	4,320	8
Lincs. (Lindsey)	2,684	6	4,810	9
Norfolk	2,793	7	3,110	6
Worcs.	4,178	10	4,119	8
Scotland	927	100	1,296	100
of which E. Lothian	587	63	861	66

Crop	1967		1970	
	Acres	Per cent	Acres	Per cent
<i>Cabbage, Spring (b)</i>				
England and Wales	25,101	100	27,150	100
of which Cornwall	2,784	11	2,835	10
Essex and G.L. (part)	1,732	7	1,456	5
Kent	4,672	19	5,320	20
Lincs. (Holland)	2,764	11	3,271	12
Worcs.	3,006	12	3,134	12
<i>Cabbage, Winter</i>				
England and Wales	12,286	100	14,441	100
of which Bedford	586	5	555	4
Essex and G.L. (part)	736	6	1,183	8
Kent	1,378	11	1,531	11
Lancs.	703	6	722	5
Lincs. (Holland)	1,180	10	1,447	10
Lincs. (Lindsey)	1,360	11	1,661	12
Norfolk	1,480	12	1,552	11
Suffolk	396	3	521	4
<i>Carrots</i>				
England and Wales	28,430	100	37,610	100
of which Cambridge and Ely	4,232	15	5,086	14
Lancs.	1,786	6	3,042	8
Lincs. (Lindsey)	1,185	4	1,747	5
Norfolk	12,685	45	16,407	44
Suffolk	3,157	11	4,678	12
Yorks. (E. and W.R.)	1,158	4	1,586	4
<i>Cauliflower, Summer and Autumn</i>				
England and Wales	15,161	100	13,509	100
of which Kent	2,407	16	2,199	16
Lancs.	1,027	7	848	6
Lincs. (Holland)	5,358	35	4,791	35
Lincs. (Lindsey)	1,355	9	1,611	12
<i>Cauliflower, Winter</i>				
England and Wales	21,434	100	17,724	100
of which Cornwall	6,649	31	6,341	36
Kent	3,598	17	3,263	18
Lincs. (Holland)	3,992	19	2,973	17
Lincs. (Lindsey)	1,555	7	1,162	7
<i>Celery</i>				
England and Wales	5,324	100	4,857	100
of which Cambridge and Ely	2,172	41	2,197	45
Lancs.	737	14	800	16
Norfolk	1,311	25	885	18
<i>Leeks</i>				
England and Wales	2,059	100	2,803	100
of which Lincs (Holland)	118	6	184	7
Norfolk	159	8	195	7
Surrey	177	9	220	8
Worcs.	453	22	562	20
Scotland	333	100	359	100
of which E. Lothian	184	55	184	51
Midlothian	96	29	78	22

Crop	1967		1970	
	Acres	Per cent	Acres	Per cent
<i>Lettuce G.R.T. and Open Summer (b)</i>				
England and Wales	14,486	100	13,760	100
of which Kent	804	6	977	7
Lancs.	2,026	14	2,257	16
Surrey	1,203	8	1,033	8
Scotland	537	100	540	100
of which Lanarks	167	31	138	26
East Lothian	142	26	129	24
Midlothian	66	12	92	17
<i>Onions, Dry Bulb</i>				
England and Wales	5,895	100	9,276	100
of which Cambridge and Ely	1,268	22	1,760	19
Essex and G.L. (part)	208	4	353	4
Hunts.	268	5	373	4
Lincs. (Holland)	1,732	29	2,710	29
Norfolk	1,346	23	1,517	16
<i>Onions, Green Salad (b)</i>				
England and Wales	3,411	100	3,309	100
of which Berks., Bucks. etc.	223	7	146	4
Essex	294	9	188	6
Kent	379	11	345	10
Surrey	220	6	183	6
Warwicks. and Worcs.	1,021	30	985	30
<i>Peas, Green for Market</i>				
England and Wales	17,275	100	12,968	100
of which Essex and G.L. (part)	2,226	13	1,859	14
Kent	1,072	6	639	5
Lincs. (Lindsey)	1,186	7	502	4
Worcs.	1,702	10	1,094	8
Yorks. (W.R.)	4,636	27	3,695	28
<i>Peas, Green for Processing</i>				
England and Wales	97,236	100	127,537	100
of which Kent	2,047	2	2,446	2
Lincs. (Holland)	7,584	8	11,303	9
Lincs. (Lindsey)	33,659	35	37,071	29
Norfolk	18,620	19	22,823	18
Suffolk	8,434	9	11,624	9
Yorks. (W.R.)	7,885	8	9,603	8
Scotland	4,194	100	4,413	100
of which Angus	1,556	37	1,510	34
Kincardine	1,028	24	1,107	25
Perth	1,594	38	1,691	38
<i>Rhubarb (total)</i>				
England and Wales	4,993	100	4,609	100
of which Cheshire	256	5	183	4
Worcs.	173	3	280	6
Yorks. (W.R.)	2,625	53	1,996	43
<i>Rhubarb (intended for forcing in current season)</i>				
England and Wales	893	100	649	100
of which Cheshire	58	6	41	6
Yorks. (W.R.)	659	74	480	74

Crop	1967		1970	
	Acres	Per cent	Acres	Per cent
<i>Watercress</i>				
England and Wales	492	100	470	100
of which Dorset	78	16	80	17
Hants.	148	30	150	32
Herts.	75	15	75	16
Wilts.	74	15	56	12
ORCHARD FRUIT (c)				
<i>Apples, cooking</i>				
England and Wales	28,996	100	27,941	100
of which Cambridge and Ely)	1,939	7	1,869	7
Kent	16,571	57	16,882	60
Norfolk	2,203	8	2,059	7
Worcs.	1,126	4	972	3
Northern Ireland	5,843	100	6,669	100
of which Armagh	4,675	80	5,561	83
<i>Apples, dessert</i>				
England and Wales	54,990	100	57,581	100
of which Essex	7,303	13	7,619	13
Kent	22,540	41	24,424	42
Norfolk	2,664	5	2,862	5
Suffolk	4,770	9	5,109	9
Worcs.	2,677	5	2,842	5
<i>Cherries</i>				
England and Wales	9,116	100	7,321	100
of which Kent	7,240	79	5,862	80
Worcs.	612	7	534	7
<i>Cider and Perry Fruit</i>				
England and Wales	13,584	100	15,058	100
of which Devon	2,358	17	2,228	15
Glos.	725	5	855	6
Hereford	5,470	40	6,162	41
Somerset	3,584	26	3,643	24
Worcs.	711	5	1,108	7
<i>Pears</i>				
England and Wales	14,593	100	13,888	100
of which Cambridge and Ely)	848	6	862	6
Kent	8,770	60	8,451	61
Worcs.	894	6	649	5
<i>Plums</i>				
England and Wales	17,690	100	16,033	100
of which Cambridge and Ely)	1,953	11	1,709	11
Kent	4,246	24	4,043	25
Worcs.	5,540	31	4,657	29
SOFT FRUIT				
<i>Blackcurrants</i>				
England and Wales	11,054	100	10,393	100
of which Essex	690	6	663	6
Hereford	1,730	16	2,005	19
Kent	1,683	15	1,296	12
Norfolk	2,070	19	1,985	19
Staffs.	558	5	522	5
Suffolk	766	7	648	6
Worcs.	1,045	9	938	9

Crop	1967		1970	
	Acres	Per cent	Acres	Per cent
<i>Gooseberries</i>				
England and Wales	4,415	100	3,989	100
of which Cambridge and Ely	813	18	559	14
Hunts. and Peterborough	266	6	256	6
Kent	925	21	827	2
Norfolk	809	18	692	17
Worcs.	358	8	325	8
<i>Raspberries</i>				
Great Britain	8,229	100	9,195	100
of which England and Wales (as a whole)	1,286	16	1,248	14
Kent	411	5	414	5
Scotland (as a whole)	6,943	84	7,947	86
Angus and Perthshire	6,265	76	6,854	75
<i>Strawberries</i>				
England and Wales	15,390	100	15,761	100
of which Cambridge and Ely	1,760	11	1,564	10
Essex	790	5	771	5
Kent	3,031	20	3,322	21
Lincs. (Holland)	1,306	8	1,113	7
Norfolk	3,463	23	3,315	21
Scotland	1,874	100	2,178	100
of which Angus	548	29	779	36
Perthshire	491	26	482	22
GLASSHOUSE PRODUCE				
<i>Bulbs for forcing</i>				
England and Wales	161	100	174	100
of which Lincs. (Holland)	79	49	103	59
<i>Carnations</i>				
England and Wales	177	100	188	100
of which Essex and G.L. (part)	20	11	17	9
Herts. and G.L. (part)	18	10	23	12
Surrey	14	8	16	9
Sussex, West	40	23	46	24
<i>Cucumbers</i>				
England and Wales	358	100	380	100
of which Lea Valley	181	51	154	41
<i>Lettuce, Glass Heated and Cold</i>				
England and Wales	1,200	100	1,468	100
of which Lancs.	239	20	265	18
Sussex, West	98	8	122	8
Yorks. (E.R.)	162	14	228	16
<i>Roses</i>				
England and Wales	106	100	116	100
of which Essex and G.L. (part)	26	25	28	24
Herts. and G.L. (part)	48	45	32	28
Sussex, West	11	10	30	26
<i>Tomatoes, Cold</i>				
England and Wales	929	100	961	100
of which Lancs.	89	10	134	14
Sussex, West	67	7	57	6
Yorks. (E.R.)	90	10	81	8

Crop	1967		1970	
	Acres	Per cent	Acres	Per cent
<i>Tomatoes, Heated</i>				
England and Wales	1,072	100	1,220	100
of which Essex and G.L. (part) (except Lea Valley)	79	7	87	7
Lancs.	108	10	143	12
Lea Valley	112	10	76	6
Lincs. (Holland)	74	7	82	7
Sussex, West	69	6	115	9
Scotland	201	100	200	100
of which Lanarks.	113	56	117	59
FLOWERS IN THE OPEN				
<i>Daffodils for cutting (b)</i>				
England and Wales	4,055	100	5,555(d)	100
of which Cornwall	801	20	1,097(d)	20
Lincs. (Holland)	1,803	44	2,470(d)	44
<i>Tulips for cutting (b)</i>				
England and Wales	1,366	100	1,447(d)	100
of which Cambridge and Ely	56	4	59(d)	4
Lincs. (Holland)	1,091	80	1,156(d)	80
Norfolk	80	6	85(d)	6
HARDY NURSERY STOCK				
<i>Roses and Ornamentals</i>				
England and Wales	8,622	100	9,547	100
of which Surrey.	1,636	19	1,614	17
<i>Fruit Trees, Bushes, etc.</i>				
England and Wales	4,469	100	2,798	100
of which Essex and G.L. (part)	435	10	310	11
Kent	493	11	243	9
Norfolk	277	6	240	9
Surrey.	247	6	131	5
Sussex, West	411	9	403	14
<i>Other Nursery Stock</i>				
England and Wales	2,096	100	2,229	100
of which Essex and G.L. (part)	169	8	80	4
Norfolk	183	9	186	8
Surrey.	142	7	341	15

Notes:

- (a) This table is not intended to be comprehensive. It covers all major crops having concentrations in their distribution and includes a selection of minor crops. The figures have been taken from the latest census available prior to publication and may not be comparable therefore with other figures in the report. Owing to changes in census coverage introduced during 1970 some of the acreages for 1970 are not directly comparable with those for earlier years.
- (b) Figures taken from years adjacent to 1967 or 1970 where data for these years are incomplete.
- (c) England and Wales acreages for 1967 taken from the 1966 Orchard Fruit Census; 1970 figures taken from the June, 1970 Agricultural Census. England and Wales figures relate to orchards grown commercially.
- (d) Estimated.

Appendix IV

YIELDS

England and Wales gross yield estimates

	Estimated average gross yield (England and Wales) tons per acre		Percentage change
	1960/61 to 1964/65	1965/66 to 1969/70	
<i>Vegetables in the open</i>			
Asparagus	0.8	0.8	—
Beans, broad	3.9	4.3	+10
Beans, runner	4.6	4.8	+4
of which:			
climbing	(a)	5.6	—
dwarf	(a)	4.2	—
Beans, French	2.9	3.2	+10
Beetroot (main crop)	13.1	14.0	+7
Brussels sprouts (tops excluded)	3.6	4.2	+17
Cabbage (glass-raised and transplanted)	9.5	11.1	+17
Cabbage (Spring)	6.0	6.8	+13
Cabbage (Summer and Autumn)	12.1	14.5	+20
Cabbage (Winter)	10.2	11.9	+17
Carrots (main crop)	13.3	16.5	+24
Cauliflower (glass-raised and transplanted)	6.3	8.3	+32
Cauliflower (Summer and Autumn)	7.6	9.4	+24
Celery (self-blanching)	18.4	19.1	+4
Lettuce (glass-raised and transplanted)	10.3	10.3	—
Lettuce (open, Summer)	6.7	7.0	+4
Onions, dry bulb	12.6	12.8	+2
Onions, green salad	5.2	5.6	+8
Parsnips	9.4	9.7	+3
Peas, green for market	3.4	3.4	—
Peas, green for processing	1.7	1.8	+6
Rhubarb, natural	12.9	13.6	+5
Watercress	9.8	13.4	+37
<i>Under glass</i>			
Cucumbers	71.5	80.5	+13
Tomatoes, cold	25.9	28.4	+10
Tomatoes, heated	40.9	45.4	+11
<i>Orchard Fruit</i>			
Cox's Orange Pippin	4.9	4.5(b)	—8
All dessert apples	5.0	4.5(b)	—10
Bramley's Seedling	6.1	4.2(b)	—31
All cooking apples	5.5	4.0(b)	—27
Cider apples	2.2	1.6(b)	—27
Plums	3.1	2.6(b)	—16
Sweet cherries	1.4	0.7(b)	—50
<i>Soft fruit</i>			
Strawberries	2.2	2.6	+18
Blackcurrants	1.6	1.5	—6

Notes

- (a) Separate yields for climbing and ground or dwarf runner beans have been available only since 1963.
- (b) Subject to adjustment in the light of the results of the 1970 Orchard Fruit Census.

Appendix V

Imports and Channel Islands supplies of fresh fruit and vegetables of kinds grown commercially in the United Kingdom compared with United Kingdom output

United Kingdom	1959				1967				1968				1969			
	Imports (a)		U.K. Output (b)		Imports (a)		U.K. Output (b)		Imports (a)		U.K. Output (b)		Imports (a)		U.K. Output (b)	
	'000 tons	£'000	'000 tons	£'000	'000 tons	£'000	'000 tons	£'000	'000 tons	£'000	'000 tons	£'000	'000 tons	£'000	'000 tons	£'000
Fruit																
Dessert apples (Imports from Aug./Feb.)	195.1	15,541.4	221.2	14,692	250.6	29,092.8	183.7	17,723	266.8	32,303.1	194.8	17,823	252.9	33,820.9	260.9	14,973
Pears (Imports from Aug./Feb.)	60.1	5,110.8	61.4	3,781	64.8	(2,559.9)	22.4	1,802	58.2	(8,988.8)	70.6	3,550	53.1	5,986.0	58.2	3,179
Strawberries (Imports from Apr./June)	0.7	239.7	36.4	4,664	0.7	(5,166.1)	47.0	7,211	0.8	(2,862.9)	44.2	6,950	1.0	(3,068.0)	53.1	9,668
Other fruit	(0.7)	(237.3)	—	17,707	(0.6)	(309.2)	—	14,418	(0.7)	(389.6)	—	19,412	(0.8)	(496.9)	—	19,155
Total	—	22,339.2	—	40,844	—	40,490.8	—	41,154	—	41,718.4	—	47,735	—	43,243.4	—	46,975
Vegetables																
Tomatoes (Imports from May/Oct.)	220.0	25,358.6	100.9	10,467	226.6	31,743.9	83.8	12,125	232.1	35,225.0	81.1	13,707	226.3	36,434.0	91.3	14,465
Mushrooms	0.5	132.7	13.7	4,954	1.4	(3,397.6)	30.9	8,477	1.3	(3,798.3)	34.5	10,060	1.0	(3,837.1)	36.4	10,748
Cucumbers	2.3	413.9	35.9	4,498	25.4	(2,175.3)	30.8	3,790	25.4	(2,626.4)	29.0	3,780	25.0	(2,501.3)	29.8	3,968
Cauliflowers	(2.1)	(356.2)	204.6	5,690	(18.3)	(2,538.5)	334.7	12,597	(18.5)	(2,505.1)	285.3	10,247	(17.0)	(2,387.6)	274.7	9,393
Carrots	33.0	2,449.3	281.8	5,688	44.2	(1,552.3)	398.3	5,047	39.8	(1,631.6)	432.4	7,603	35.6	(2,347.9)	340.2	7,095
Letuce (Imports from Jan./Aug.)	14.4	1,424.3	88.5	6,672	13.4	(2,810.2)	127.1	9,101	10.6	(3,112.2)	119.0	10,408	12.3	(3,780.1)	124.6	12,136
Other veg. (exc. potatoes)	10.5	1,925.5	—	44,341	—	16,730.9	—	58,936	—	16,850.3	—	64,834	11.9	20,017.2	—	71,333
Total	—	43,190.4	—	80,310	—	59,172.2	—	110,093	—	63,437.1	—	120,639	—	70,301.0	—	129,138
Channel Islands																
(already inc. in imports above)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Fruit—Total	—	3.6	—	—	—	1.4	—	—	—	—	—	—	—	0.5	—	—
Vegetables	75.4	9,685.4	—	—	70.7	10,577.9	—	—	—	—	—	—	—	—	—	—
Tomatoes	(73.4)	(9,171.0)	—	—	(68.1)	(9,736.3)	—	—	—	—	—	—	—	—	—	—
Cauliflower	8.1	405.5	—	—	15.8	789.0	—	—	—	—	—	—	—	—	—	—
Letuce	0.4	42.5	—	—	1.1	174.9	—	—	—	—	—	—	—	—	—	—
All other veg. (exc. potatoes), peas (Harvested dry)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	10,174.6	—	—	—	11,615.8	—	—	—	12,488.4	—	—	—	13,206.4	—	—

(a) Includes supplies from the Channel Islands (see also separate Table). The periods shown in parenthesis cover those months when home supplies are at least 10 per cent of total supplies entering distribution.

(b) Output is from commercial holdings of over 1 acre and relates to crop years beginning in the calendar years indicated.

(c) Provisional.

... Less than 50 tons or less than £50.

Appendix VI

MANPOWER

Labour force on horticultural holdings, showing also the number and extent of such holdings

Horticultural holdings of 275 s.m.d. or over, England and Wales

	1966	1967	1968	1969	1970
MAINLY VEGETABLE-GROWING HOLDINGS					
Number of holdings	1,835	1,958	1,478	1,725	1,651
Number as percentage of all agricultural holdings	1.2	1.3	1.1	1.3	1.3
Total area (crops and grass), acres	93,997	114,061	84,535	107,463	109,299
Average area (crops and grass), acres	51	58	57	62	66
Number of r.w.t. workers	4,500 (a)	5,094	3,844	4,388	3,894
Average number r.w.t. workers per holding	2.45 (a)	2.6	2.6	2.5	2.4
Average number r.w.t. workers per 100 acres	4.8 (a)	4.5	4.5	4.1	3.6
MAINLY FRUIT-GROWING HOLDINGS					
Number of holdings	2,357	2,181	1,824	1,947	1,891
Number as percentage of all agricultural holdings	1.6	1.5	1.3	1.5	1.5
Total area (crops and grass), acres	130,209	135,847	120,568	127,640	126,392
Average area (crops and grass), acres	55	62	66	66	67
Number of r.w.t. workers	5,154 (a)	5,492	4,797	4,784	4,369
Average number r.w.t. workers per holding	2.2 (a)	2.5	2.6	2.5	2.3
Average number r.w.t. workers per 100 acres	3.95 (a)	4.05	4.0	3.7	3.5
GENERAL HORTICULTURAL HOLDINGS					
Number of holdings	10,632	11,132	11,001	9,317	9,571
Number as percentage of all agricultural holdings	7.1	7.6	8.0	7.0	7.4
Total area (crops and grass), acres	501,277	562,012	560,164	516,736	509,659
Average area (crops and grass), acres	47	50.5	51	55	53
Number of r.w.t. workers	36,146 (a)	34,480	33,852	30,357	27,947
Average number r.w.t. workers per holding	3.4 (a)	3.1	3.1	3.3	2.9
Average number r.w.t. workers per 100 acres	7.2 (a)	6.1	6.0	5.9	5.5
ALL HORTICULTURAL HOLDINGS (total of the above)					
Number of holdings	14,824	15,271	14,303	12,989	13,113
Number as percentage of all agricultural holdings (b)	9.9	10.4	10.4	9.8	10.2
Total area (crops and grass), acres	725,485	811,920	765,267	751,839	745,350
Average area (crops and grass), acres (b)	49	53	54	58	57
Number of r.w.t. workers	45,800 (a)	45,066	42,493	39,529	36,210
Average number r.w.t. workers per holding (b)	3.1 (a)	2.95	3.0	3.0	2.8
Average number r.w.t. workers per 100 acres (b)	6.3 (a)	5.55	5.6	5.3	4.9
ALL AGRICULTURAL HOLDINGS OF 275 s.m.d. or over (for comparison)					
Number of holdings	149,206	147,042	137,129	132,524	129,073
Total area (crops and grass), acres	21,664,847	21,706,694	21,392,410	21,256,067	21,286,607
Average area (crops and grass), acres	145	148	156	160	165
Number of r.w.t. workers	278,400 (a)	265,424	247,734	235,154	203,772
Average number r.w.t. workers per holding	1.9 (a)	1.8	1.8	1.8	1.6
Average number r.w.t. workers per 100 acres	1.3 (a)	1.2	1.2	1.1	1.0

(a) Interpolated or otherwise estimated.

Classes of labour on horticultural holdings

Regular whole time workers on different types of horticultural holding. England and Wales

Type of holding (275 s.m.d. and over)	Number as percentage of all r.w.t. workers on agricultural holdings					Male workers as percentage of all r.w.t. workers on each type of holding					Male workers aged 20-64 years as percentage of all r.w.t. workers on each type of holding				
	1966	1967	1968	1969	1970	1966	1967	1968	1969	1970	1966	1967	1968	1969	1970
Mainly vegetable-growing	1.6(a)	1.9	1.5	1.9	1.9	91(a)	88	90	89	87	73(a)	73	74	75	
Mainly fruit-growing	1.9(a)	2.1	1.9	2.0	2.1	89(a)	91	91	91	90	79(a)	80	82	81	
General horticultural	13.0(a)	13.0	13.7	12.9	13.7	79(a)	83	83	83	82	68(a)	69	70	69	N.A.
All horticultural (total of above) (b)	16.4(a)	17.0	17.1	16.8	17.8	81(a)	84	85	85	83	70(a)	70	72	76	

(a) Interpolated or otherwise estimated.

(b) Because of the effect of rounding totals of some percentages and averages may not agree exactly.

N.A.—Not available.

Age structure of male labour on horticultural holdings

Regular whole time male workers on different types of holdings in 1969, England and Wales

Age group	Number					Number as percentage of number of workers in corresponding age group on all agricultural holdings				Number as percentage of number of workers in corresponding age group on all horticultural holdings				Number as percentage of total number in all age groups on each type of holding			
	mainly vege- table growing holdings	mainly fruit- growing holdings	on gen. hort. holdings	on all hort. holdings	on all agric. holdings	mainly vege- table growing holdings	mainly fruit- growing holdings	on gen. hort. holdings	on all hort. holdings	mainly vege- table growing holdings	mainly fruit- growing holdings	on gen. hort. holdings	on all hort. holdings	mainly fruit- growing holdings	on gen. hort. holdings	on all hort. holdings	on all agric. holdings
	holdings	holdings	holdings	holdings	holdings	holdings	holdings	holdings	holdings	holdings	holdings	holdings	holdings	holdings	holdings	holdings	holdings
Under 20 years	487	253	3,373	4,113	29,163	1.7	0.9	11.6	14.1	12	6	82	12	6	13	12	13
20-24 years	515	378	3,289	4,182	29,947	1.7	1.3	11.0	14.0	12	9	79	13	9	13	13	14
25-34 years	821	702	4,430	5,953	44,974	1.8	1.6	9.9	13.2	14	12	74	21	16	18	18	21
35-44 years	778	848	4,635	6,261	44,401	1.8	1.9	10.4	14.1	12	14	74	20	20	18	19	20
45-64 years	1,178	1,947	8,716	11,841	64,506	1.8	3.0	13.5	18.4	10	16	74	30	45	35	35	30
65 and over	137	220	733	1,090	5,478	2.5	4.0	13.4	19.9	13	20	67	3	5	3	3	3
All age groups	3,916	4,348	25,176	33,440	218,469	1.8	2.0	11.5	15.3	12	13	75	100	100	100	100	100

Source: Ministry of Agriculture, June census returns.

Notes:
s.m.d. Standard man days.
r.w.t. Regular whole time (excluding the occupier and his wife).

Definition of types of holding as referred to in these tables:

- 'All agricultural': holdings with 275 s.m.d. or more in agriculture and horticulture together of which,
 - 'General horticultural': holdings not mainly vegetable- or fruit-growing (q.v.).
 - 'Mainly horticultural': holdings with more than three-quarters of their total s.m.d. in horticulture and more than three-quarters of their
 - 'Mainly vegetable-growing': holdings with more than three-quarters of their total s.m.d. in vegetables, whether in the open, under glass or in sheds.
 - 'Mainly fruit-growing': holdings with more than three-quarters of their total s.m.d. in horticulture and more than three-quarters of their horticultural s.m.d. in fruit.

Appendix VII

CO-OPERATION

Grant-aid to horticultural marketing co-operatives

Nature of grant	Grants paid or committed, U.K.					
	March 1960 to December 1965		January 1966 to December 1970		Total to December 1970	
	No. of projects	Amount	No. of projects	Amount	No. of projects	Amount
		£		£		£
HORTICULTURE ACT 1960, SECTION 4 GRANTS						
Grants towards survey and general promotional work(a)	3	26,209	—	16,542	3	42,751
formation of new co-operatives improvement of management and increasing efficiency of existing co-operatives	19	21,232	15	27,071	34	48,303
	47	54,493	31	20,144	78	74,637
Total	69	101,934	46	63,757	115	165,691
WORKING CAPITAL GRANTS (AGRICULTURE AND HORTICULTURE ACT 1964, SECTION 4 GRANTS)						
Grants towards initial operation	2	11,841	—	—	2	11,841
existing co-operatives	10	39,985	16	38,210	26	78,195
Total	12	51,826	16	38,210	28	90,036
MARKET DEVELOPMENT SCHEME (A.M.D.E.C.)						
Grants towards consumer research	1	139	—	—	1	139
experiments to improve produce experiments to improve handling, storage and packing of produce	2	1,359	—	—	2	1,359
investigation into marketing methods	2	1,446	1	787	3	2,233
experiments to improve marketing techniques	1	438	2	4,594	3	5,032
	3	21,102	—	—	3	21,102
Total	9	24,484	3	5,381	12	29,865
*HORTICULTURE IMPROVEMENT SCHEME						
Grants towards horticultural producers' marketing businesses	194	553,121	120	203,084	314	756,205
GRAND TOTAL OF THE ABOVE	284	731,365	185	310,432	469	1,041,797

(a) Grants to national organizing bodies, not individual societies.

* No further applications have been accepted under the Horticulture Improvement Scheme since October 1967 when grants became available under the Agricultural and Horticultural Co-operation Scheme.

Agricultural and Horticultural Co-operation Scheme 1967

HORTICULTURAL PROPOSALS APPROVED OCTOBER 1967-DECEMBER 31st 1970

	Horticultural Marketing			Horticultural Production			Totals		
	Number	Total Cost	Grant	Number	Total Cost	Grant	Number	Total Cost	Grant
11 Feasibility Studies into new co-operatives ...	10	£ 12,578	£ 7,993	11	£ 18,654	£ 9,351	21	£ 31,232	£ 17,344
11 Studies sponsored by existing co-operative organizations ...	16	33,870	19,868	4	4,982	3,579	20	38,852	23,447
11 Initial operation of new co-operatives ...	13	148,088	42,138	14	193,767	52,169	27	341,855	94,307
Expansion of existing Co-operative organizations which had not applied to Council for grant aid on a previous occasion ...	34	578,035	154,876	3	65,803	11,841	37	643,838	166,717
Expansion of co-operative organizations which had applied to Council for grant aid on a previous occasion ...	201	1,936,520	501,420	4	41,823	10,486	205	1,978,343	511,906
Other proposals ...	6	14,554	5,014	—	—	—	6	14,554	5,014
TOTAL	280	2,723,645	731,309	36	325,029	87,426	316	3,048,674	818,735

Location and Type of Co-operative Engaged in Marketing Members' Horticultural Produce

Source: Agriculture Departments

NUMBER OF HORTICULTURAL MARKETING CO-OPERATIVES REGISTERED AT 31ST DECEMBER 1970*

	Industrial and Provident Societies	Company-type co-operatives	Total
England . .	36	33	69
Wales . .	3	1	4
Scotland . .	3	—	3
N. Ireland . .	2	—	2
U.K. Total .	44	34	78

* Excludes the Land Settlement Association, Women's Institutes, Nuclear Stock Associations and certain auction societies but includes multi-purpose societies whose activities include marketing members' produce.

Appendix VIII

PRODUCTION GRANTS

Horticulture Improvement Scheme: summary of progress to 31st December, 1970 (production businesses only)

	Applications					
	Number received			Number withdrawn or rejected	Approved (a)	
	Under 1960 and 1964 Schemes to 20.7.66	Under 1966 Scheme from 21.7.66– 31.12.70	Total		Number	Estimated cost of proposals
England and Wales	16,797	38,265	55,062	5,149	48,739	£ 60,158,192
Scotland . .	1,040	2,045	3,085	332	2,666	2,804,439
Northern Ireland .	539	1,223	1,762	260	1,410	1,765,578
U.K. Total .	18,376	41,533	59,909	5,741	52,815	72,728,209

Horticultural Improvement Scheme: analysis by facility and main enterprise of approvals under the 1966 scheme to 31st December, 1970 in England and Wales (production businesses only)

Facility	Proposals approved in England and Wales between 21st July 1966 and 31st December 1970 under the 1966 scheme					
	No. (b)	Estimated cost of approvals in different sectors according to main horticultural enterprise (a)				
		Glasshouse production (c)	Fruit	Vegetables	Nursery stock	Total
		£	£	£	£	£
Reclamation of waste land	82	3,748	27,749	12,895	3,758	48,150
Grubbing up of orchards	550	6,802	174,461	20,585	1,115	202,963
Removal of hedges	174	7,298	17,861	9,437	3,068	37,664
Land levelling	75	6,313	7,038	5,392	3,898	22,641
Roads, paths, etc.	1,751	648,835	340,993	212,558	101,178	1,303,564
Cattle grids	12	464	109	563	217	1,353
Fences, walls, etc.	242	17,163	83,258	6,880	13,579	120,880
Shelter belts	95	1,174	17,500	3,142	1,178	22,994
Watercress beds	45	5,966	159	180,807	747	187,679
<i>Buildings</i>						
Production	7,470	19,151,264	134,779	524,495	186,481	19,997,019
Non-production	2,511	1,382,834	2,775,568	1,341,585	685,709	6,185,696
Yards, loading platforms and ramps	391	71,012	77,865	86,245	29,085	264,207
<i>Thermal Insulation, Vapour or Gas Sealing</i>						
In production or conditioning buildings	53	29,529	8,410	4,892	1,131	43,962
In storage buildings	80	91,306	81,511	20,354	2,983	196,154
Sewerage and effluent disposal	189	51,028	2,629	12,368	3,669	69,694
Gas or electricity	2,572	769,681	74,331	101,105	54,371	999,488
Water supply	220	55,275	2,564	15,559	2,427	75,825
<i>Plant and Equipment (Production)</i>						
Control of environment in buildings						
Irrigation	5,562	1,989,804	19,584	76,049	26,906	2,112,343
Ventilation	962	675,200	3,751	20,257	2,741	701,949
Other	717	416,608	22,969	15,776	16,265	471,618
Outdoor irrigation	738	25,826	189,607	270,246	27,945	513,624
Preparation of soil	588	280,129	1,073	41,418	11,061	333,681
Control of pests and diseases	3,540	102,212	782,469	263,950	91,291	1,239,922
Movement of produce, materials, etc.	1,300	299,963	144,357	331,019	105,399	880,738
Planting, potting, pruning and frost protection	2,564	109,397	130,393	584,684	136,017	960,491
Containers for growing produce	342	890,819	3,270	78,243	32,543	1,004,875
Harvesting Equipment	1,522	79,916	99,451	1,332,723	328,203	1,840,293
<i>Heating Systems</i>						
Glasshouses	6,033	9,077,353	15,156	32,158	84,711	9,209,378
Other buildings	299	215,719	17,619	45,323	71,986	350,647
Soil sterilization systems	373	167,755	954	5,158	6,925	180,792
<i>Plant and Equipment (Storage and Preparation for Market)</i>						
Control of temperature	354	153,060	208,185	95,477	75,156	531,878
Movement of produce	1,082	100,050	363,572	318,131	39,823	821,576
Grading	1,300	122,342	388,847	284,206	129,117	924,512
Preparation	671	62,160	72,184	299,476	79,684	513,504
Packing	193	14,288	28,439	32,616	34,977	110,320
Miscellaneous	155	10,035	6,989	32,324	6,395	55,743
Ancillary operations	210	25,413	3,370	4,249	1,954	34,986
Total (21st July 1966 to 31st December 1970).	45,018	37,117,741	6,329,024	6,722,345	2,403,848	52,572,958
Total to 20th July 1966 (1960 and 1964 schemes)	19,379					15,585,234
Grand Total to 31st December 1970 (all schemes)	64,397					68,158,192

**Small Horticultural Production Business Scheme, 1964:
summary of progress to 31st December, 1970**

	Applications			
	Number received	Number withdrawn or rejected	Approved	
			Number	Expected grant(d)
England and Wales . . .	4,085	452	3,551	£ 1,340,851
Scotland . . .	635	133	455	173,060
Northern Ireland . . .	84	13	71	23,433
U.K. Total . . .	4,804	598	4,077	1,537,344

**Orchard grubbing: summary of grant-aided
work to 31st December, 1970**

	Applications under Section 3 of the 1964 Act since April 1964		
	Number of approved proposals	Estimated cost of work	Grant payable
England and Wales . . .	2,503	£ 586,840	£ 195,613
Scotland . . .	1	73	24
Northern Ireland . . .	82	7,523	2,508
U.K. Total . . .	2,586	594,436	198,145

	Applications under the Horticulture Improvement Scheme since July 1964		
	Number of approved proposals	Estimated cost of work	Grant payable
England and Wales . . .	708	£ 258,403	£ 86,134

Notes:

- (a) Grants at the rate of one-third of the approved cost, to which a supplement of 5 per cent has been added between 17th January 1966 and 31st December 1970.
- (b) These numbers relate to the individual facilities approved and not to the number of approved proposals.
- (c) Includes cut flowers and house plants being grown wholly or partly in glasshouses.
- (d) Grant is at the rate of £50 per acre of eligible land (maximum £500) and is paid in instalments over three years.

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MINISTRY OF
AGRICULTURE, FISHERIES AND FOOD
DEPARTMENT OF AGRICULTURE AND FISHERIES
FOR SCOTLAND
MINISTRY OF AGRICULTURE
FOR NORTHERN IRELAND

EXAMINATION OF THE
HORTICULTURAL INDUSTRY
1970

LONDON
HER MAJESTY'S STATIONERY OFFICE
1971

Foreword

THE attached record summarises the findings of the third Examination, by officials of the Agricultural Departments in consultation with the three Farmers' Unions, of developments and trends within the horticultural industry in the United Kingdom. We should like to thank those representatives of the industry who have co-operated in the Examination, and in particular those who gave up their time to serve as members of the specialist groups whose reports constitute Part II of the record.

The purpose of this Examination, as of the previous Examinations whose records were published in 1966 and 1968, has been to make a factual study of the contemporary horticultural scene and of trends within the industry. It has been undertaken at a critical time for the industry, when growers are facing the challenge of rising costs and far-reaching changes in the traditional patterns of distribution and marketing. To meet this challenge, and the further challenge which must arise if this country enters the European Economic Community, demands the grower's close attention to the managerial and marketing aspects of his enterprise. The industry's ready and constructive participation in the Examination is evidence of its concern to make the most productive use of its skills and resources. We are confident that it can and will develop its own particular strengths to meet competition in the only way that can bring long term success to any productive industry: by studying market requirements, and by a continual readiness to undertake whatever adaptations of practice those requirements may dictate.

J. M. L. PRIOR,

Minister of Agriculture, Fisheries and Food.

GORDON CAMPBELL,

Secretary of State for Scotland.

R. MAUDLING,

Secretary of State for the Home Department.

PETER THOMAS,

Secretary of State for Wales.

July, 1971.

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Acknowledgement

Surveys of glasshouse equipment, mushroom growing and hardy nursery stock are included in this record. The agricultural departments are grateful for the help of the many growers who completed questionnaires.